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. . THE OPTICAL . .

MAGIC LANTERN

JOURNAL

And Photographic Enlarger.

A Magazine of Popular Science for the Lecture-Room and the Domestic Circle.

WITH WHICH IS INCORPORATED THE "LANTERN WORLD."

Vol. 9.—No. 104 JANUARY, 1898. [Entered at Stationers' Hall.] Price 2d., Post Free 3d

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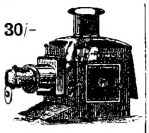
30/- 

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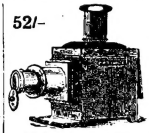
52/- 

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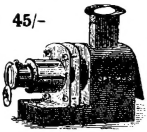
45/- 

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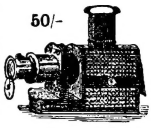
50/- 

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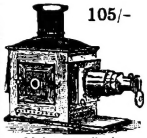
105/- 

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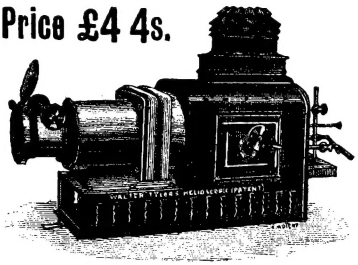

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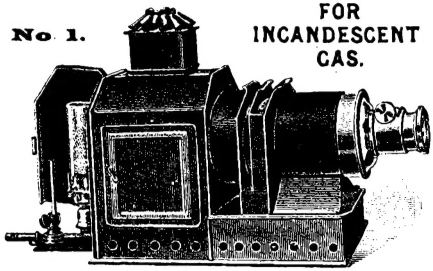

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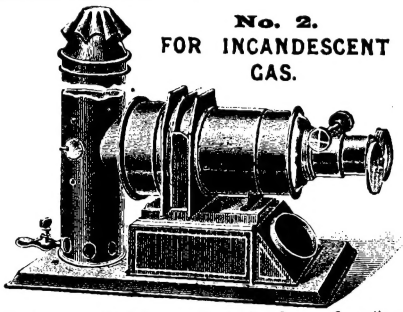

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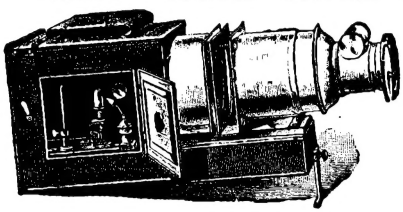

Supplied complete for limelight, but can also be fitted for either incandescent gas or acetylene gas if desired.

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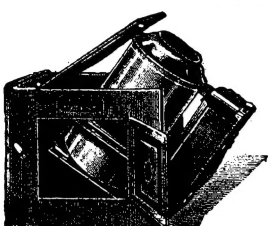

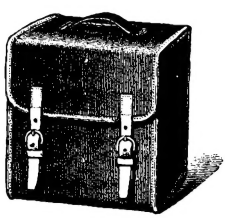

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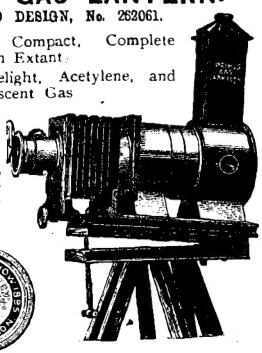
Most Convenient, Compact, Complete Lantern Extant.

Complete for Limelight, Acetylene, and Incandescent Gas.

The whole is packed in a neat stained and varnished case, with lock and key, strap handle, and drawer for sundries, forming a very compact outfit.



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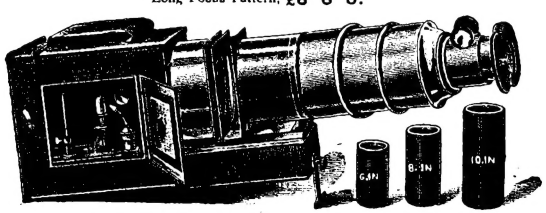

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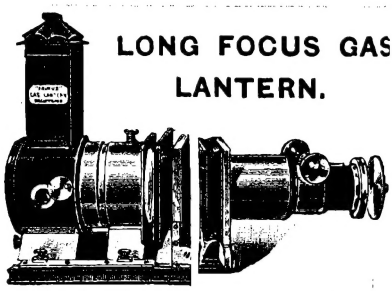

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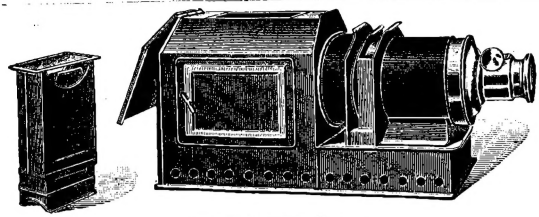

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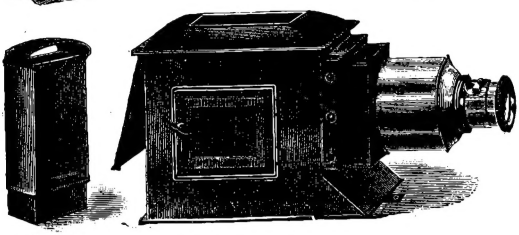

No. 1.—**Japanned Tin,** all brass front, complete in japanned tin case.

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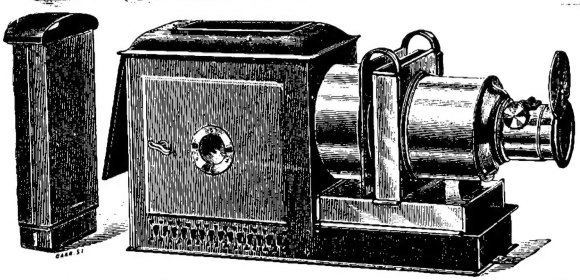


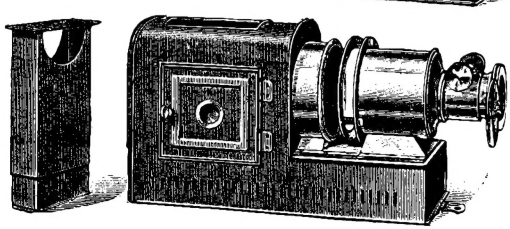
No. 3.—**Russian Iron,** with all brass front and sliding tube. In Russian iron case with handle.

PRICES—

Fitted with three-wick lamp £2 10 0

Fitted with four-wick lamp 2 12 6

Fitted with jet, complete for limelight 3 0 0



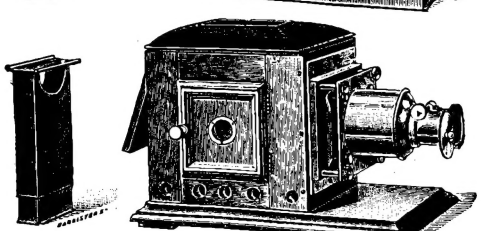
No. 4.—**Russian Iron,** massive all brass front and sliding tube, open stage, two panelled doors with brass rim sight holes. Complete in Russian iron case with handles.

PRICES—

Fitted with three-wick lamp ..£3 3 0

,, four-wick lamp .. 3 5 6

,, jet, complete for limelight.. .. 3 13 0



No. 6.—**Mahogany Body,** with one panelled door and long double moulded baseboard, brass-bound sight hole, heavy solid brass front and stages, well lacquered.

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Complete with tray and top for limelight (no jet) £2 15 6

Complete with three-wick lamp .. 2 18 0

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Superior stained case 0 7 6

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A PROFESSIONAL lanternist and cinematographist of great experience is open to engagements, with or without his own apparatus, in town or country, on very moderate terms. Reference, Editor of this Journal. —Address, Optics, 13, York-street, Walworth, London.

GREAT bargains in high-class triple, bi-unial, and oil-lighted lanterns, grand effects, lecture sets, etc.; illustrated lists post free 2d.—W. C. Hughes, Brewster House, 82, Mortimer-road, Kingsland, London, N.

A LANTERN operator, with his own apparatus, desires an engagement with a lecturer or otherwise.—Address, J. B., care of Journal.

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60 SLIDES, well coloured, Round the World, and lecture, 22s. 6d.; other sets cheap; cinematograph, shutterless; perfection, to be seen working, price £7 10s.—Morrison, 58, Theirlmore-road, Liverpool.

A CHANCE seldom to be met with.—Mr. Edmund H. Wilkie has for disposal the following valuable and useful sets of exquisitely painted photographs and effects. Being the work of artists formerly engaged at the late Royal Polytechnic Institution they are unsurpassed for brilliancy and definition, and are priced at about one half their real value to secure an immediate sale. Amongst others the following sets call for special notice:—Rye House, day, night, and mechanical effect of swans crossing lake (quite new subject), 3 slides, 9s.; Bridge of Sighs, Venice, by night, mechanical effect, moonrise lights up buildings, ripple on water, lights in windows gradually disclosed, very fine, 2 slides, 8s.; Forth Bridge by day, night, mechanical effect, light from lighthouse and moonrise, 3 slides, 8s.; Haddon Hall by night, double slip to gradually disclose illuminated windows, 2 slides, 6s. 6d.; The Guardian Angel, effect of moonrise, ripple, and appearance of Angel (very fine), 2 slides, 6s. 6d.; The Taj Mahal, India, day, night, and illuminated by coloured lamps, 3 slides, 7s. 6d.; The Castle of Drachenfels on Rhine, with lever effect of moon rising, very effective, 2 slides, 7s. 6d.; Temple of Heaven, Pekin, day, night, and illuminated by coloured chinese lanterns (an excellent effect), 3 slides, 7s. 6d.; Town Hall, Paris, and effects, 4 slides, 10s.; and numerous other selected subjects all equally good; also a few very superior curtain slides, "good nights," and mottoes (some usually sold at 12s. 6d. each), at 2s. 6d. and upwards.—Edmund H. Wilkie (late Royal Polytechnic Institution), 114, Maygrove-road, West Hampstead. Note.—Offers invited for a few sets (second-hand) of the finest hand-painted effects. Particulars on application.

NOAKES' patent triple lantern, complete with jets, dissolver, registering runners, lenses in quick-changing mounts, and case, £30; also cinematograph for photography or projection, and five films.—Noakes & Norman, Nelson-street, Greenwich.

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APPARATUS.—A. Rateau for the Animated Photography. Specifications 5026 and 18014, 1897. This apparatus is automatic, *i.e.*, it comprises a clockwork mechanism wound up beforehand, and it is sufficient to press a button to make it work. Total height of the apparatus, 1 foot; total length, 10 inches; width, 6 inches; weight, 10 lbs.; weight of smaller, 8 lbs.; length of film entering upon the bobbins, 150 feet; number of photos taken by once winding up the spring, 650; size of each photo, $\frac{8}{8}$ by $\frac{3}{8}$ inch; speed can be regulated from 1 up to 30 pictures per second; absolute equi distance of the pictures, whence excellent projection; no vibration; one takes the apparatus in hand, aims at the scene to be photographed, and merely presses the button; the same button serves to arrest the movement instantaneously; excellent light with the projection; the same apparatus can be utilised for the three operations—taking the negatives, printing the positives, and projection; the apparatus can also be worked with a crank worked by hand; no abrupt stoppage of any of the parts as in an apparatus with tooth-drums, therefore smooth movement, no shock, and no breakage of parts to fear; great simplicity of parts and of manufacture, it being possible to sell the apparatus for projection only at about £1 10s.; film always rolled up on two bobbins; a film utilised during an experiment 748 times at a speed of 25 pictures per second, and still being serviceable; the apparatus can also be utilised like an ordinary magic lantern, etc., the only apparatus that is perfectly automatic; the movements are perfectly smooth, hence a spring of small power suffices; the weight of my apparatus is only 8 lbs., whereas the weight of some other outfits is as much as 25 lbs.; patent to be sold, or partner wanted with £5,000; fortune to be realised during the next photographic season.—Write to Mr. Augustus Rateau, 25, Margaret-street, Cavendish-square, W. (Demonstration given by appointment.)

A LARGE number of good second-hand slides to clear, cheap; we do slide making and colouring, first-rate work, at a low price, lists free.—T. T. Wing, Chatteris, Cambs.

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NOTICES.

THE *Optical Magic Lantern Journal and Photographic Enlarger* is issued on the 1st of every month, price Two Pence, and may be obtained from all Newsvendors, Railway News Stalls, Photographic Dealers, or from the Publishers, at the following rates, post free:—

12 months, 3/-. United States, 75 cents.

EXCHANGE Column, General Wants, &c. (not Trade)—First 20 words, 6d.; and for every 3 additional words, 1d.

SMALL ADVERTISEMENTS must reach the office not later than the first post on the 24th of each month. All cheques and postal orders to be made payable to the Magic Lantern Journal Company, Limited.

EDITORIAL communications must be addressed, **J. HAY TAYLOR**, Advertisements and business communications to **Jos. T. Smith, Secretary, Magic Lantern Journal Company, Limited, 9, Carthusian Street, London, E.C.**

American Agents:—The International News Co., 83 and 85, Duane Street, New York City.

NOTES.

A Happy New Year to all.

Scientific use of the Cinematograph.—The cinematograph is to be used on the 21st inst. to photograph the eclipse of the sun. An instrument has been perfected for the purpose by Mr. Maskelyne, of the Egyptian Hall, which is to be taken out to India by the Rev. J. M. Bacon, who has charge of the British Astronomical Association Eclipse party. It is the intention to take a series of photographs at the rate of six per second, and it is expected that this will settle the question as to changes of the corona during the eclipse.

Sheffield Lantern Society.—On the 2nd ult. the members of this thriving society held their annual dinner at the "Black Swan" Hotel. The gathering was a large and influential one, under the presidency of Dr. Manton. After the usual toasts had been given, the president gave an illustrated lecture (Mr. Staniforth at the lantern), then followed a good musical programme.

Yarmouth Missions to Seamen Society.—A short time ago the chaplain to this Mission expressed the hope that £10 would be donated for the purpose of buying a lantern and slides to entertain the fishermen when ashore at this port. £11 5s. was soon collected, and the entertainments will be got into shape without delay.

Importers and Exporters.—In the ANNUAL, several pages of importers and exporters were to be found. These pages, we may say, were bound up immediately following that part over which we exercised our editorship. This editorship was, however, confined to a given number of pages, as per our arrangement with the Magic Lantern Journal Company, Limited, the proprietors, and included only those pages devoted to original articles, and the particulars of new apparatus. With these our duties ended. The business department, however, decided to bind up with the ANNUAL certain lists of exporters and importers, and up to the time of the 1897-8 ANNUAL going to press we personally opposed this (not on the score of any infringement of copyright, for we were ignorant of their source, but on other grounds). In this matter we were over-ruled, and the name of the official of the company responsible for such was inserted at the head of the lists. We have been informed that these lists were taken from the *Mercantile Year Book and Directory of Exporters*, which is conducted by Mr. Walter Lindley Jones, of 21, St. Helen's Place, E.C., to whom a letter of apology has been sent by the Company, together with a cheque, which has been accepted on the understanding that the lists be withdrawn from all copies of the ANNUAL in hand. This latter we learn has been done, and the proprietors wish us to announce to any subscribers or members of the trade who possess copies containing these lists, that the revised edition of the ANNUAL will be sent free of cost on receipt of the old copies. Personally, we regret the insertion of such lists coupled with matter which had been passed by us in our capacity as editor, and take no blame whatever on our editorial shoulders.

Fatal Acetylene Explosion.—A Dalziel telegram states that a terrible explosion occurred the day before Christmas at the Acetylene Gas Company's works, Jersey City, U.S.A. The explosion of one gas tank containing acetylene caused eight or ten others to explode, hurling a dozen men a distance of 20 feet, and killing fifteen outright. The works were set on fire and totally destroyed.

A Lantern Operator Publicly Thanked.—Much depends in a lantern lecture upon the operator at the instrument, yet how seldom does he get a vote of thanks. As a rule all the credit goes to the person who gives or reads the lecture. About a fortnight ago Mr. E. Dockree gave an excellent lecture at the Ealing Photographic Society, and at the termination gracefully complimented Mr. A. Richardson for the splendid manner in which he had projected the slides. It is only when the lecturer understands the management of a lantern that he has any idea of the amount of skill required on the part of the person in charge of the lantern.

Change of Name.—The firm of Peters, Mantz and Company, of Worth Street, N.Y., U.S.A., makers of lantern apparatus, has been changed to that of Keller, McMillan & Mantz. The new firm are preparing a large catalogue which they inform us will reach us at an early date. When we receive it, we shall have pleasure in commenting upon it.

History of Cinematographs.—On another page will be found an interesting article by Mr. W. C. Hughes, which he has written expressly for his book "Art of Projection," published by him. We are indebted for the opportunity of its thus early appearance in our columns. In the "Art of Projection" the subject is dealt with at even fuller length, and in this latter allusions are made to the apparatus manufactured by Mr. Hughes' firm.

X-Rays and Customs Examination.—The French Customs authorities have discontinued the use of the X-rays for examining luggage, as it has not met with the success that was anticipated.

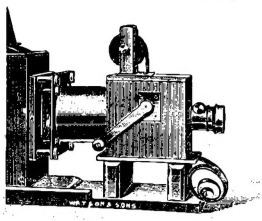
Peddling Spectacles.—A curious case has been brought against the Mayor of Buffalo, N.Y., U.S.A., for refusing to grant a license to a pedlar who has been in the habit of selling spectacles. The reason for the refusal was that the pedlar would be unable to properly fit the eyes of his patrons, and thus more harm than good was likely to result.

Lectures on the Navy.—On the 15th and 22nd inst. Captain S. E. Wilmot will give popular lectures, illustrated with lantern slides, at the Imperial Institute. We learn that these lectures are to be specially applicable to juveniles.

W. WATSON & SONS, 313, High Holborn, London, W.C.

£12 12s. **THE MOTORGRAPH.** £12 12s.

For Projecting Animated Pictures and Exposing Films for producing same.



CONSTRUCTION, very strong without complications. WORKING, simplicity itself. ACTION, steadier than high-priced machines. Can be used with any Magic Lantern. Takes Films of Standard Perforation. Produces most brilliant picture, passing more light than other machines.

Absolutely Reliable! Cannot be Deranged in Working!! Very Compact. (Outside size 6 × 4⅜ × 5½).

For full particulars of above and prices of Films, write for Catalogue No. 8.

NEW SEASON'S SLIDE LIST READY SHORTLY.

W. WATSON & SONS

(Opticians to H.M. Government),

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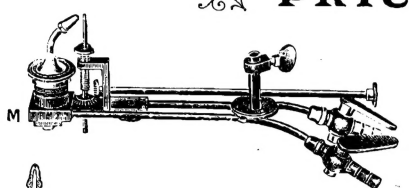
THE "INJECTOR" MIXED JET.

Patents 10,554 and 24,761/93.

PRICE 30s.



This is the only Mixed Gas Jet which will work at full power with coal gas taken direct from the town supply, and oxygen from a cylinder. In order to effect this the oxygen, on its way to the mixing chamber, is made to pass through the small Injector **I** in the sketch at a pressure of about 12 lbs. per square inch. In passing through the Injector it sucks a supply of coal gas from the pipe **H**, which is connected with the house pipe, and forces it forward through the short pipe **T** into the mixing chamber **M**. Here the mixed gases meet the baffle plate **B**, which has the two-fold effect of silencing the passage of the gases, and ensuring their complete admixture. The mixed gases then pass through holes in the edge of the plate, and so to the burner. The requisite pressure of oxygen is obtained in the ordinary way by a fine tap on the cylinder, or an automatic regulator fitted with a high-pressure spring to deliver at about 15 lbs. pressure.

Three seasons' experience have fully established the superiority of this Jet over all others. It will yield **THE FULL 1,800 TO 2,000 CANDLE-POWER** (so-called) of the ordinary mixed jet when taking its supply of coal gas direct from the town's pipe, or even from a bag *without any pressure at all*. If a town's supply is not available, it will work just as well with coal gas from a cylinder. We cannot see why ordinary mixed jets should be purchased which cannot offer these alternatives. As for blow-through jets, we do not know why they should be used at all, when with the same economy and convenience of working, the Injector Jet will give two or three times the light.

The working of the Jet is simpler than that of an ordinary jet. When the **H** tap is once adjusted, it does not need to be touched again when using town's gas. The turning off or on of the oxygen supply regulates automatically the supply of coal gas. This is a great convenience in actual use.

Most existing jets can be fitted with an Injector to enable them to take their coal gas supply from the house pipe.

The Jet will in certain cases be sent on approval on deposit of purchase price. Further particulars free on application to

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As supplied to Queen's Theatre, Manchester; Professor Hermann's Magical Entertainment, New York; Exhibited with enormous success, Crystal Palace, Sydenham, etc., etc.,

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The Apparatus can be purchased outright, and let out on hire. Exhibitions are also arranged for all kinds of Entertainments, with experienced operators.

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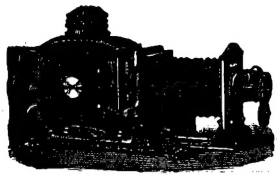

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No. 3, Plainer Form, £6 6s. COMPLETE.

The Improved **"PHOTINUS"** is the most powerful oil lantern in the world. Price **£4 4s.**

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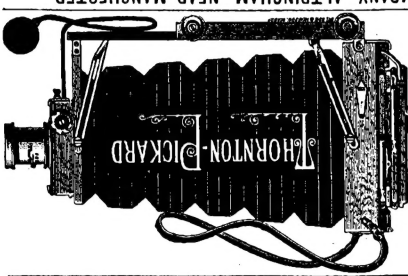

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THE NEW SETS FOR THIS SEASON ARE:—The Record Reign of Queen Victoria—A Trip to Paris—Old and New Friends at the Zoo—Rambles about London—The Counties of England—Corsica—An Hour with some Popular Poets—Hong Kong — Temperance Entertainment — Fungi — The Growth of the Queen's Dominions—The Jubilee Procession—Little Em'ly—Bloomsbury Christening—and several Moral Tales, illustrated by Life Models.

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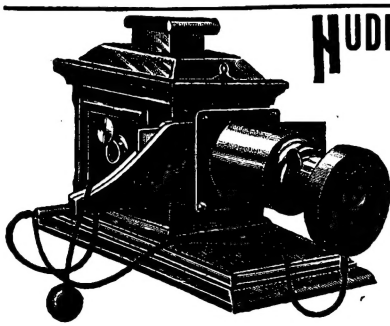

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Is again much improved, and is now practically noiseless. Fits any lantern without alteration,

Price **17/6.**

Automatic Centering Carrier,

Centres any size slide, a perfect luxury after using the old style. **21/-.** Special terms to dealers.

SOLE MAKER—

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A Hanging Cinematographed.—On the 18th ult. a man was publicly hanged in Missouri, U.S.A., for murder. A large crowd congregated, as is usual in such cases, and a photographer in the vicinity took a series of cinematographic pictures of the event. The set of slides illustrating the gruesome spectacle have been pronounced "good," and these are to be duplicated and public exhibitions given in various towns.

£200 in Prizes.—A photographic competition is announced by the Thornton-Pickard Manufacturing Company, Limited, for work done by means of the apparatus manufactured by them.

Viewing Film Transparencies in the Cinematograph Without Projection.

IT almost becomes necessary to apologise for the spelling of the word cinematograph, for we have been taken to task for not commencing it with a "k," one correspondent asking: "Why fly to the French language for the 'c'?" However, usage has a great deal to account for in this. Dealers and exhibitors have to a large extent adopted the former spelling, and, besides this, it is now so generally understood by the public, that to educate them to a change of initial letter is much easier said than done. So—for the present, at any rate—we will spell it *cinematograph*.

Many cinematographs have only one sprocket wheel, and it is to those which we will allude in the following remarks. It often happens that one would like to inspect some films, or perhaps at a moment's notice show one to a friend, without having to go to the trouble of projecting them on the screen. With the single sprocket wheel the film can only be passed through in one direction, and that is downwards; this, for projection purposes, is, of course, quite correct, but if one intends to look through the lens at them with a light placed beyond, it is necessary that recourse be had to some means whereby the image can be erected, otherwise the pictures will be viewed wrong way up. If the film be placed in the instrument the other end about, so that they will appear the correct way up, all the movements will, of course, assume a backward appearance.

The erection of the image can be attained by the use of an ordinary erecting prism (as at Fig. I.), which can be held in the hand in front

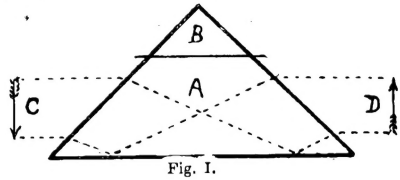


Fig. I.

of the lens so that the rays of light pass through (as shown in the dotted lines). The portion of such prism that is utilised is marked A, while that part which could, if desired, be cut off is marked B.

Prisms which are of high class and accurately ground are somewhat expensive, and if one does

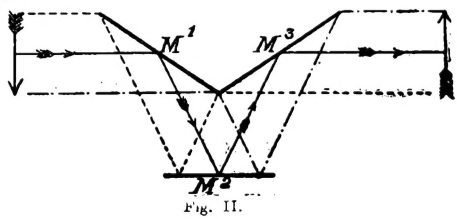


Fig. II.

not possess such, a cheap and simple form can be made after the style suggested in our columns some time ago by Mr. E. D. Bartlett, which arrangement consists of three thin mirrors arranged at angles shown at Fig. II., the dotted lines showing the arrangement of erecting.

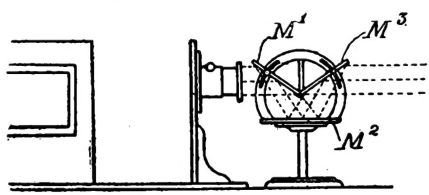


Fig III.

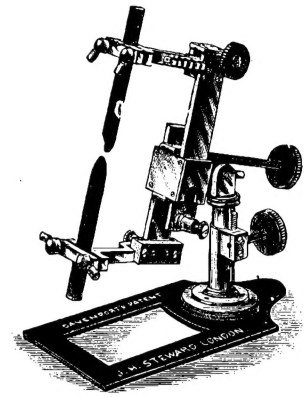
Fig. III. shows a convenient way by which these mirrors can be adjusted. When viewing cinematographic pictures in this manner it is necessary that a piece of, say, opal glass be placed between the light and the film, else will the best of films appear both streaky and weak.

Electric Light in Theatres

THE great reduction in the amount of premium on fire insurance of theatres and places of amusement where the electric light is used instead of the oxy-hydrogen lime-light and ordinary gas stage lighting has given quite an impetus to electric light work, and among the many theatres recently fitted, one of the most complete installations is that at the Crystal Palace theatre. The whole of the stage lighting is controlled by some very complete but simple switchboards, graduating water resistances for the incandescent lamps, and suitable resistances for the arc lamps, and, what is a great advantage in point of convenience, all the wires or leads, as they are called, return to the switchboard, where safety fuses are inserted, and all are so readily get-at-able that if a "blow-out" of any fuse occurs, it can be at once replaced without interfering with scenery or wires about the flies or stage, as would be the case if main wires were "tapped" at various places in the circuit. The requirements of Mr. Carr, the engineer of the Crystal Palace, have been well carried out by Edison & Swan, Limited, and many of his suggestions embodied in the beautiful pieces of work forming the scientific portion of the installation. The appearance of this, viewed as a whole, is most imposing with the voltmeters, ammeters, etc., and its utility as demonstrated the other day is beyond question, while the safety and general adaptability for the purpose has been duly certified by the County Council Inspector.

Instead of limelight, the theatre light boxes, having special lenses, are fitted with Davenport's arc lamp, made on a modified plan by J. H. Steward, of 406, Strand, London, and after the trial order the whole of the limelight boxes were replaced with the new type, for it was found the lenses employed in the regular trade pattern theatre boxes were not suitable for the electric light, producing, as they did, too much coloured fringe. These arc lamps generally work for stage purposes at 8 amperes, and with both the small boxes for the flies and larger for illuminating the scenes they answer capitally with this current.

The exposed parts of lamp are covered with asbestos, while the boxes are designed for good ventilation, and are lined with Russian iron, besides having a skin of asbestos between the wooden cover and the iron. For larger currents such as are required for cinematographs and special optical projection Mr. Steward has recently brought out a new pattern of the Davenport patent lamp, which can be used with any current and any size of carbon, if necessary as much as 30 amperes, but generally it will be found that 15 to 20 amperes will be all that is required. The form as seen in illustration is adaptable to almost any optical lantern with little or no alteration, and when on its tray every possible



adjustment is quickly and accurately obtained for centering with the most delicate optical system, the vertical rack being specially useful in giving alteration in height without interfering with the distance from condenser.

It has been estimated that the use of electric light instead of oxy-hydrogen for uses as above, results in a saving of about 50 per cent. in cost of working.

How Cinematographic Machines Work.—No. II.

By MAGNET.

IN the year 1888 Louis Anné Augustin Le Prince, of New York, obtained a patent for an invention, based upon the hypothesis that the impression produced upon the retina by objects in motion is approximately the same as that which would be produced by presenting to the eye in rapid succession a great number of pictures

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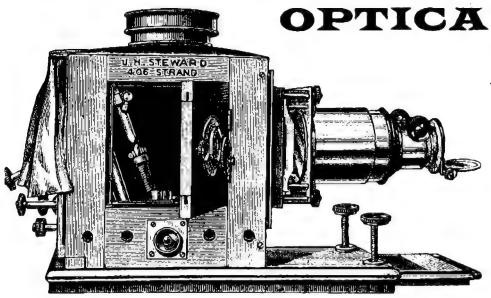
OPTICAL LANTERNS

FOR

INCANDESCENT GAS, LIME, OR ELECTRIC LIGHT.



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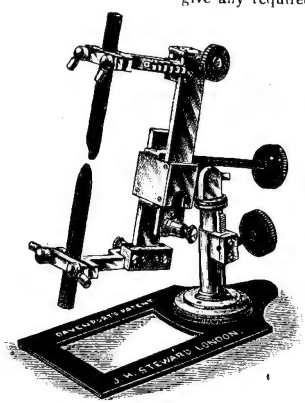

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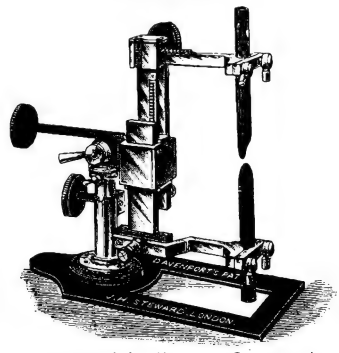

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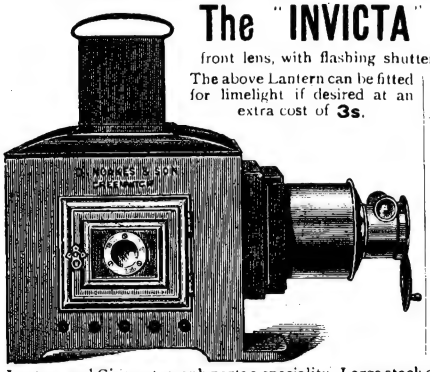
Manufacturers of High-Class Lantern and Photographic Apparatus.



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front lens, with flashing shutter.

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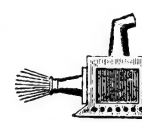
The Works of the BRIN COMPANIES are open during business hours to the inspection of their Customers, who are at liberty to test the quality of Gas being manufactured, and to watch their own Cylinders being tested and filled.



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BIRMINGHAM OXYGEN COMPANY, Limited, Saltley Works, BIRMINGHAM.

representing the successive positions of the object at exceedingly short intervals of time; such pictures he termed "animated" pictures.

The apparatus he employed consisted, firstly, of a photographic camera for the negatives; and secondly, a projector for projecting the pictures obtained by the camera on a screen in the order in which they were photographed, whereby the successive impressions on the eye of the spectator will convey a true idea of the changing appearance of the objects within range of the camera during the exposure.

The accompanying sketch (Fig. V.) shows a view partly in side elevation, and partly in section of the arrangement he used for projecting the animated pictures. The film transparency is mounted on two ribbons of metal, punched with holes H^7, fitting on the pins P^1 of the guide rollers G^6 G^6, the transparencies being stored on drums D D^1, which run loosely on shafts having square ends, and are supported in grooves M^6 M^6 in the framework C^6. The

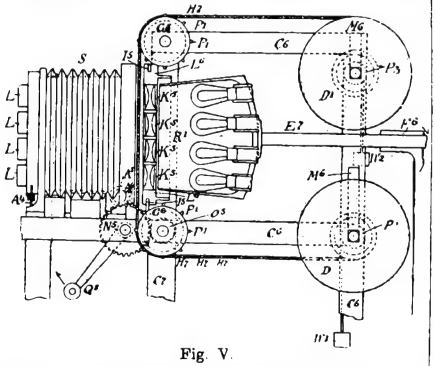

Fig. V.

weights and cords W^1 W^3 rolled on small pulleys P^2 P^3 secured to drums D and D^1 maintain the necessary tightness and steadiness of the films. At the back of the films is the reflector R^1, with 16 or more incandescent lights supported by the rods E^1 sliding in socket F^6. In front of the reflectors are 16 double condensers K^5 K^5, throwing the light through the 16 pictures, and mounted on a frame L^6 grooved at r^5, so that they may slide in and out of the frame C^6 laterally when required.

The lower of the guide rollers G^6 carries a pinion O^5 gearing in wheels N^5, supported by the frame C^6, and provided with the crank handle Q^5.

A number of shutters were employed, operated by a mutilated gear wheel, which was so arranged to expose one picture after the other in rapid succession.

The speed of one revolution of the wheel A^4 per second will give 960 pictures per minute, and in this manner it will be seen that by increasing the rate of motion of the wheel A^4 it is easy to produce several thousands in the same time; and with drums of large diameter, and a few reserve boxes at hand to be fixed behind the objective, it will be possible with a suitable light, and by means of the projector, to reproduce the aspect of animated scenes, such as meetings, processions, races, and the like.

It is also mentioned that when the receiver is provided with only one lens, as it sometimes may be, it is so constructed that the sensitive film is intermittently operated at the rear of the lens, which is provided with a properly timed intermittently operated shutter, and correspondingly in the deliverer. When only one lens is provided, the band or ribbon of transparencies is automatically so operated as to bring the pictures intermittently, and in the proper order of succession, opposite the said lens. (No. 423 of 1888.)

Among the earlier workers who devoted their inventive talent to the development of cameras for taking photographs in

rapid succession

is the name of Friese Green, a photographer, and Mortimer Evans, civil engineer. In the early part of 1889, a patent was applied for by these two persons, of which the following account may be of interest to the readers as it contains much that is still adhered to in many of the recent forms of cinematographs. Referring to the accompanying figures, A is a main shaft upon the rotation of which the operation of all the parts is dependent. It is supported on opposite carrying frames and is rotated by a winch-handle inserted through a tubular light shield inserted through the side of the enclosing case. 10 is a roll of sensitised paper; 11, strip which passes from between such roll and a feed-roller 12, under a guide roller 13 between exposure screens 13, 14, 15, between rollers 16, 17, to a take-up roller 18 which derives its motion directly from the shaft 5, and imparts simultaneous and a corresponding extent of motion to the roll 10, through the roller 12. The roll 10 can freely rotate on a supporting pin 19, which is supported by the framework. It is driven by frictional contact with the roll 12, the surface of which is roughened and which in turn is driven by frictional contact with the roll 20, of the exposed strip which accumulates on the flanged take-up roller 18.

The roller 18 is mounted on a supporting pin 24 which is screwed into or otherwise suitably supported by the frames. It is driven by frictional contact with a split tubular hub 25, projecting into the hollow axis 26, *vide* Fig. VI., from a toothed pinion 27 mounted on the pin 24 and which is driven from the toothed wheel 28 on the shaft 5 by suitably supported connecting gearing 29, 30, by which it is caused to receive a relatively increased speed of rotation which is effective through the frictional contact of its hub 25 with the hollow axis 26 of the roller 18, in causing the latter to take up the slack of the exposed strip immediately it is advanced by the operation of the rollers 16, 17. the wheel 28 and is continuously rotated from the shaft 5. The gearing 28, 40 is so proportioned that one revolution of the winch-handle will affect two complete cycles of the operations. The pinion 40 gears with another like-sized pinion 41 fast on a spindle 42, which is carried in bearings in the frames, and carries a hollow escapement hub 43 on the circular circumference of which the tooth 37 normally rests. While the tooth 37 thus rests on the hub 43, the roller 16 remains stationary, and the portion of the strip 11, between the screens 14, 15, is arrested, and the exposure is affected; and meanwhile the continuing rotation of the shaft 5 causes the unwinding of the spring 38,

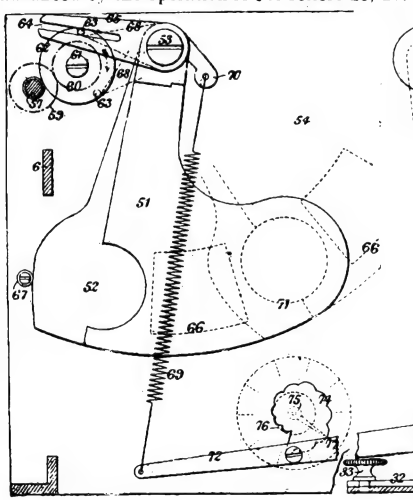

Fig. VII

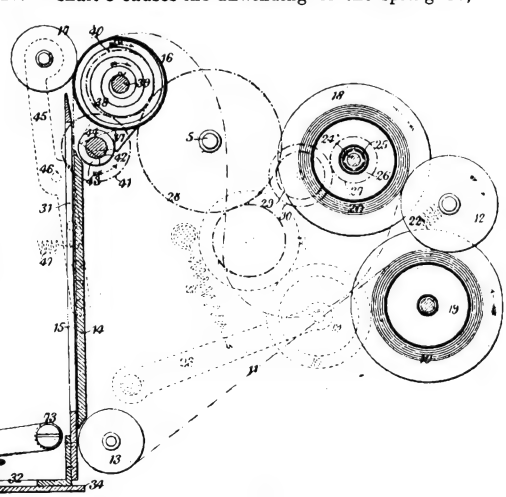

Fig. VI.

The roller 13 guides the strip between the screens 14, 15.

The exposure screen 14 prevents any light from reaching the sensitised strip behind it and the screen 15 is made with an aperture 31 through which the photographic representation can be projected on to the portion of the sensitised strip supported between the screens.

The roller 16 is provided with end caps and with projecting pointed discs, and is made fast at the one end to an escapement tooth 37, and is connected by a spiral spring 38, to a spindle 39 by which the roller and such attachments are supported. The spindle 39 is carried in bearings in the frames and has pinned thereon a toothed pinion 40, which gears with and the rotation of the hub 43, the recessed part 44 of which once in each revolution permits the tooth 37 to pass, whereupon the spring 38 causes the roller 16 to complete a revolution (the motion of the roller being then again arrested by the tooth 37 again coming into contact with the circumferential part of the escapement hub 43, which revolution is effective in advancing the strip 11 the required length, advancing the exposed portion towards the take-up roller 18, and drawing the next following portion, let off from the roll 10, into position for exposure. As the operations of the roller 18 are limited to the extent of the portion advanced by the roller 16 to be taken up, and as such advanced portion is equal to the length

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of the strip required for each of the photographic representations, it follows that wherein the roller 12 is actuated from the roller 20, that the winding up of each such portion will cause the roll 10 to simultaneously unwind a corresponding length ready for the next photographic representation, and that this will always occur notwithstanding the continually decreasing diameter of the roll 10 and the continually increasing diameter of the roll 20. The roller 17 is supported by lever arms 45, which are pivoted at 46 in the frames and it is borne against the end parts of the roller 16 by adjustable springs 47 hooked to the frames. It is formed with raised rims which prevent its intermediate part from injuring the sensitised face of the strip, and with

intermediate grooves

which allow of the projecting rims of the roller 16 getting an effective hold of the edges of the strip.

The shutter is timed to operate during each of the times the portion of the strip in position for exposure is arrested in such position. It is composed of two reciprocating portions 51, 52, both operated from the shaft 5. The part 51 serves principally as a light screen, and reciprocates on a light spindle 53 supported by an end plate 54, and is operated from the shaft 5 by a bevel pinion pinned in the spindle 39, gearing with a like-sized bevel pinion fast on a spindle 57, which is supported on a bearing projecting from the framework and in the end plate 54, and by a toothed pinion 59 also fast on the spindle 57, and which gears with a like-sized pinion 60 supported by a stud 61 projecting from the end plate 54, and which pinion is made fast to a disc provided with a projecting pin 63 which engages with a slot 64 in an arm 65 which is made fast to a shutter 51, such gearing being proportioned so that each revolution of the spindle 39 imparts one complete reciprocation to the shutter 51. The shutter 52 is made with an aperture 66, and also rocks on the spindle 53, and it is raised together with the shutter 51 from the position indicated in full lines in Fig. VII. (where the shutter 52 abuts against a rubber stopper 67) to the position indicated in dotted lines, which position the shutters assume immediately preceding the moment of exposure, by the pin 63 engaging with the arm 65 of the shutter 51, and with an arm 68 made fast to the shutter 52. Immediately the pin 63 passes beyond the range of the arm 68, the shutter 52 is actuated by the contraction of a spring 69, which is connected to an arm 70 projecting therefrom, and its aperture is thus caused to cross an aperture 71 (the position of which is indicated in dotted lines) made in the case 8, and into which the lens is inserted, thus permitting of the necessary exposure of the then stationary portion of the strip to the momentary action of the lens, immediately following the occurrence of which both shutters 51, 52, assume the positions indicated in full lines in Fig. VII.

The speed of action of the shutter 52 can be adjusted as may be required by regulating the tension of the spring 69, which may be effected by means of a lever 72 pivoted at 73 to the end plate 54, and to one end of which the spring is connected, the lever being capable of being set into different positions by a nail 74, on a pin 75 passing through the front of the case, and operated from the exterior by a thumb nut 76, adapted with an index and pointer 77, so that any desired definite tension may be readily given to the spring for regulating the period of exposure as may be required. The whole of the aforesaid mechanism is enclosed in a suitably shaped case, the actuating handle (if worked by hand), the lens and exposure regulator alone projecting or being visible from the exterior. (No. 10,131 of 1889.)

(To be continued.)

Duncan's Mechanically-Worked Triple Lantern.

By G. R. BAKER.

THE readers of this journal have had put before them recently the particulars of Beechey's and Keevil's dissolving-view lanterns, and the points of interest in each having been enlarged upon, it occurred to me they would like to know something about a mechanically-worked triple lantern constructed some 13 years ago. It is the first time it has been illustrated in the technical press and fully described, and I have no doubt it will claim attention at sight. The inventor, Mr. W. H. Duncan, at that time residing at Coalbrookdale, and now of Acton, Middlesex, deserves great credit for the skill shown in scheming out the mechanical arrangement, and for the ability displayed in constructing the apparatus for the control of light, dissolving, and slide-changing.

The idea that occurred to Mr. Duncan was that if a high-class dissolving view lantern could be made that would enable one person—if need be, the lecturer—to sit down and change the slides at will by some simple appliance, it would be a great boon, and being an engineer he set to work and constructed the apparatus as illustrated, with which he could, by pressing on a pedal, dissolve and bring on the next picture. As all the slides were arranged beforehand in proper order on one side of the lantern, and an empty box or receptacle on the other, provision was at hand to receive the slide that had been shown, and which had been passed through the lantern mechanically.

In order that the details of this arrangement may be understood, I will refer to the illustrations.

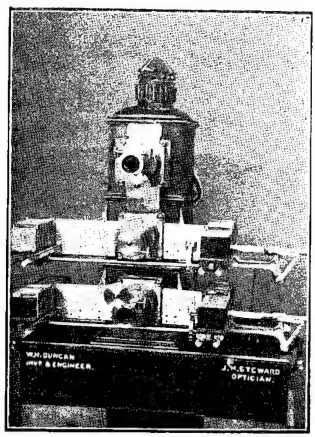

Fig. I shows the apparatus in front elevation.

The slide-changing arrangements consist of four brackets bolted to the sides of the lantern body, and which carry eight horizontal guides that are fitted with four sliding-racked receptacles for carrying the photographic or other slides. Two grooved conductors are fixed in position so that when moved, they push or conduct the slides from the rack and pass into the optical axis for exhibition, and also deliver them into the receiving rack on other side of lantern body. The lower and the upper pairs of rack carriers referred to are moved forward, one pair at a time, by a ratchet wheel and pinion, and the travel of the rack is equal to the distance from centre to centre of the divisions of the rack.

As explained, two of the racks are filled with pictures and placed in position on one side of the lantern; the first pictures are put in line with the conductors in each lantern, and empty

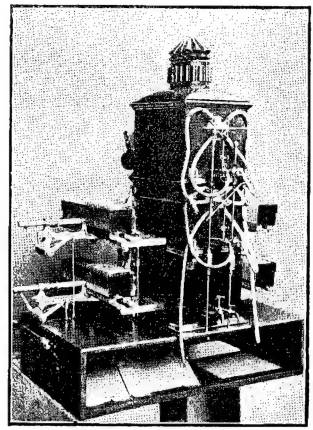

Fig. II. shows the apparatus in back elevation.

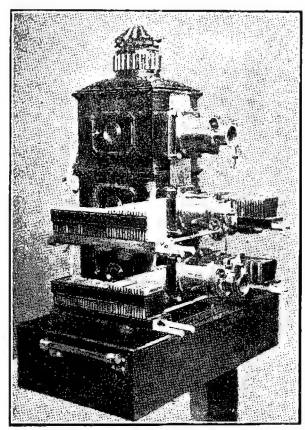

Fig. III. shows a perspective view of front and side.

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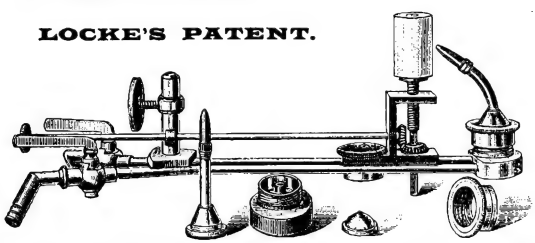

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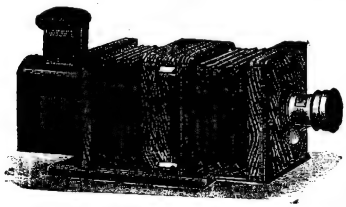

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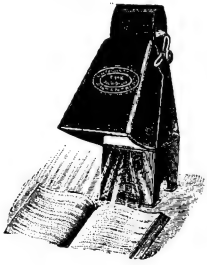

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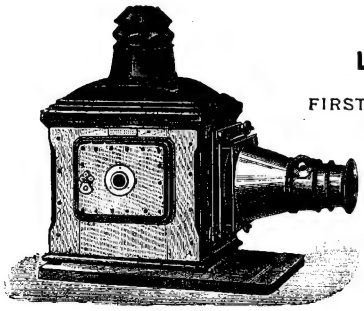

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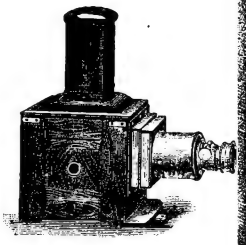

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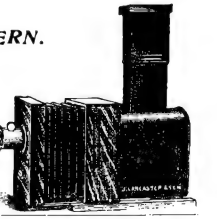

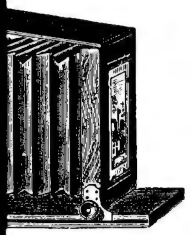

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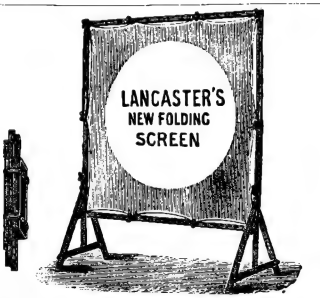

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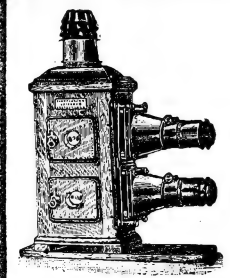

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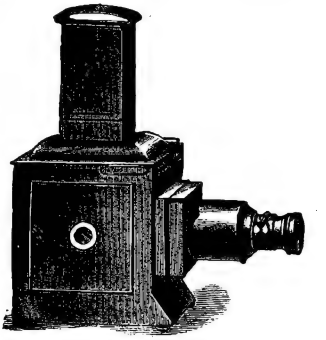

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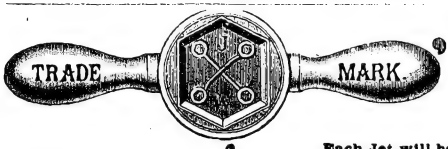

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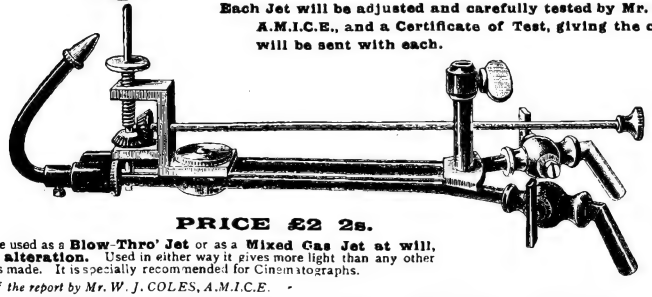

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The above can be used as a **Blow-Thro' Jet** or as a **Mixed Gas Jet at will, without any alteration.** Used in either way it gives more light than any other Jets made. It is specially recommended for Cinematographs.

Below is a copy of the report by Mr. W. J. COLES, A.M.I.C.E.

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Having made thorough tests of the capabilities of this Jet under various conditions, I find as a mean of the result of several experiments—That when using the coal gas direct from the house main a light equal to **845** candle-power was obtained with best hard limes of ordinary size. Without any alteration to the Jet, but having the hydrogen under pressure (1-lb per square inch is sufficient) and using a lime not less than 1½-in. diameter, a light equal to **1150** candle-power was obtained. By a slight movement of the adjusting screw and an increase of pressure of oxygen (3-lbs. per square inch) a light of from **1800** to **2000** candle-power was obtained, but the lime will not withstand the heat at this power for more than a short time. The mixture of the two gases under all the above various conditions is perfect.

August 6th, 1897. W. J. COLES, A.M.I.C.E.

SPECIAL "HARDAZION" LIMES, 1½-in. in diameter, for above High Power Ejector Jet, in air-tight tins, containing 6 Limes, price **3s. 6d.** per Tin of 6.

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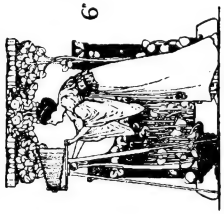

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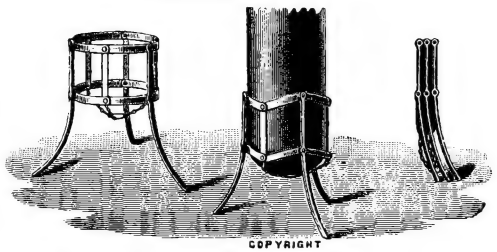

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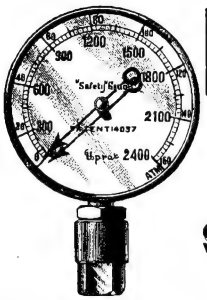

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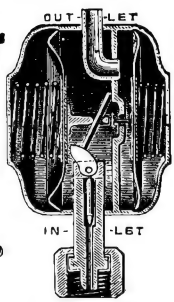

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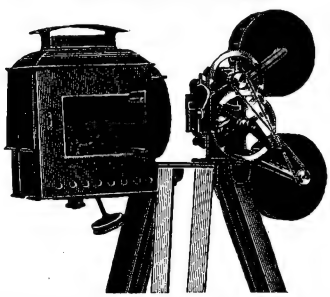

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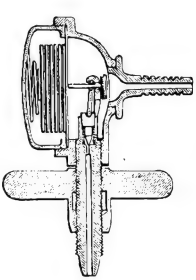

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racks are similarly placed on opposite side of lantern to receive the slides. A lever actuating a plunger pushes the first picture out of the rack, and then passes into the conductor and before the light, and when exhibited the requisite time, passes into the empty rack on opposite side of lantern.

On the return of the plunger referred to, the stroke affects the dissolving automatically, for the dissolving tap is turned, and, as will be seen by Fig. II. it is a six-way one (the lower), it follows that the light is lowered in one lantern and raised in the other. This movement is performed by the vertical weighted rods being alternately lifted by the under levers shown in illustration. The act of making this movement advances the racked receptacles one space, so that when the next slide is wanted and the lever or pedal controlling the mechanism is depressed, a new picture is brought in front of condenser. An indicator is provided, so that no mistake may be made, the downward motion depressing a pointer which shows which lever has to be pressed next.

By this means mechanical arrangements are at hand that by one movement of the lever a new slide is placed in the lantern after it has taken out the used one and placed it in the receiving rack. This it does at the right moment after it has darkened the lantern where the change has to be made, and has also raised the light in the other lantern; thus slide-changing and dissolving are mechanically performed at one operation. The third (top) lantern is fitted for use with effects or special slides, and is provided with on and off gas dissolver.

A Little Information about the Cinematograph.—No. I.

By W. C. HUGHES.

THE cinematograph, as it is called, is one of the greatest novelties of the age, and, therefore, considerable public interest is taken in it. It originated from the old zoetrope, which was first made by Dubose, the optician of Paris, who carried out the ideas of Plateau, an inventor—a blind man. Mr. Muybridge, of America, made the study of motion a speciality; he arranged a battery of cameras, and had a kind of race-course prepared opposite them, so that by the aid of an electrical arrangement he could reverse the shutters of the lenses at fixed points showing the exact movements of any kind of animal passing in front. Mr. Edison, the great inventor, had also stated that a machine might be made which could be used for the eyes just as the phonograph is used for the ears, working them together so that both motion and sound could be produced at the same time. He tried to do this microscopically, so to speak. It is stated that he gave to each picture one exposure of nine-tenths of one-forty-sixth part of a second, and that the mechanical part of the machine moved the sensitive tissue forward the breadth of the picture in the remaining one-tenth of one-forty-sixth part of a second. Forty-six pictures were taken for each second of time, making 2,760 in one minute, or 165,000 per hour.

An idea in the cinematograph direction was first thought out by Mr. Freise Green, of England; another gentleman also invested much money in perfecting a machine for moving pictures, but did not bring it to a successful issue—many years of labour without result. The machine was of very large dimensions, large enough to fill a small room. It may have cost over £1,000; anyhow, it broke the inventor's heart, and he died—and his expensive apparatus was sold by auction for something like £15. Since then numbers of inventive brains have taken the matter up, viz., Lumiere Frerés, of Lyons and Paris; Mr. Paul and others, of London, were the first to introduce it publicly into England. The principle of the machine is constructed to show motion in its various stages of action. The action makes the figures, as it were, appear stationary, yet full of life. Most machines have shutters to close out each picture during every stage of its movement, but, unfortunately, they cause a great amount of flickering which is very distressing to the eyes, and will often cause sickness and headache; in fact, some of the machines are so unscientifically constructed that the shutter itself cuts off half the light, which produces a nauseating, flickering, dark shadow, and an audience thus becomes wearied and tired of the performance. Exhibitors should note this defect, and have as little to do with most shutter machines as possible, otherwise their reputation will be damaged. The only way to avoid this unpleasant defect is to dispense with the shutter altogether.

WHAT IS THE VALUE OF A SHUTTER?—Where films are printed very darkly and with dark backgrounds in order to improve the con-

trasts it may be desirable to use a shutter—not a large one that covers half the picture, but a small one, constructed on such precise geometrical lines that it shall work very perfectly and cause as little flickering as possible.

But do not use it only in the case of exceptional films, for remember no matter how small the shutter is the impression is always left on the retina of the eye about one-tenth of a second, but, as before stated, with dense films it will be found very useful indeed.

The machines now in use are legion, but eight-tenths of them are not worth the brass they are made of, being clumsy, inefficient, badly constructed, and noisy, like the clanging of a hammer in a blacksmith's shop or the rasping of a piece of iron on a nutmeg grater, the inventors in many instances being mere tyros without any mechanical knowledge whatever. The most successful and

perfect machine

of the future will be the simplest and the least complicated; the others should be avoided. The more simple, the most effective and the best for results. It is absolutely necessary to have high-class engineering work, not as many are made, very indifferently—the working parts only stamped brass and the fittings uneven, and not true—because great strain is put on all the working parts on account of the rapidity with which the mechanical parts are revolved, that unless scientifically constructed and well made will always be a failure, sometimes twelve to fifteen hundred pictures passing through the machine in less than a minute. Purchasers should see at a glance whether a machine is thoroughly well made or not; if not well constructed they should have nothing to do with it.

To describe the machine more fully would be waste of time, there are dozens on the market all aiming to the one end, perfectly or imperfectly as the case may be, therefore purchasers should be chary and invest with their eyes open, and secure one from a specialist in optical projection in order to ensure success, and not, as many do, seek advice of inexperienced dealers or commission agents, who may be quite ignorant of technicalities. Some of the machines tear the films dreadfully, and utterly spoil them in a month. It is said that one of the cinematograph machines tears the films so badly they do not last even a fortnight. On the other hand, there are several which do not tear or injure the films in the least.

Many of the machines are an infliction, and the public are becoming tired of them because they project the living pictures so badly that the name of an animated picture show—as it used to be in the case of a lantern show—is sufficient to drive people miles away; but an exhibition given with a perfect machine, without the shutter, or, if any at all, a suitable one, together with first-class pictures, is a real pleasure and a treat, and will always be welcomed with delight either publicly, privately, at home or abroad.

The optical systems and illuminating mediums play an important part in the matter. The lenses and condensers should be so arranged as to pass the greatest amount of light through the film to the screen. The front lenses should be about 2-inch back focus, and the condensers of short focus. The film is placed between these at a suitable distance in order to intercept the cone or rays of light formed by the latter at a point where nearly all shall pass through with comparatively little waste. Between the film and condenser there should be placed a glass trough filled with water. The addition of alum which so many think useful in effecting the heat rays is not necessary, water alone being sufficient. The celluloid film should not be allowed to remain stationary for any length of time before an unprotected light, otherwise it may become injured, but in fixing or adjusting the film there will be sufficient light reflected to enable the operator to see what he is about.

To be candid, the audience should never see what is going on, either before, during, or after an exhibition, it is unprofessional and slovenly. The cleaner and neater it is done the more it is appreciated by those on the other side of the screen.

(To be continued.)

The Lanternist's Practical Cyclopædia.—No. XV.*

By CHARLES E. RENDLE.

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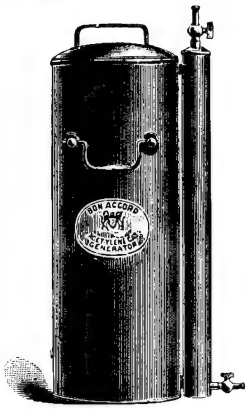

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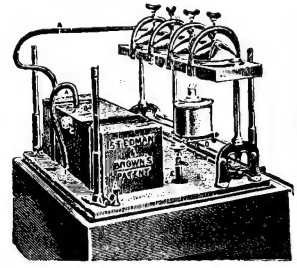

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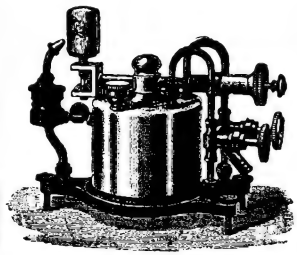

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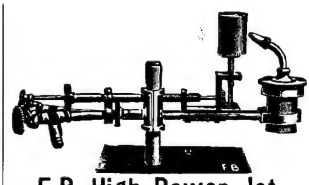

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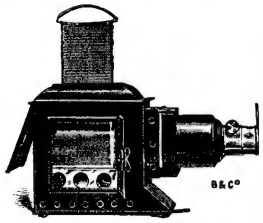

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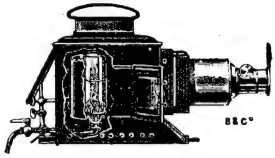

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Price Complete in Metal Case, containing Burner with Mantle and Talc Chimney, Gas Jet and Tray, Reflector and Special Top, as illustration,

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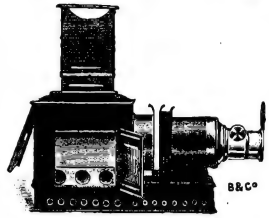

New Pattern Japanned Tin Lantern,

With 4-inch Condensers, Sliding Front, good quality, Projection Lens, with Flasher and Rack and Pinion Focusing, 4-wick Lamp for burning Petroleum, packed complete in neat Metal Case,

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The above Lanterns take full-size Slides, 3¼ by 3¼. Lightning Carriers, 1/- each.

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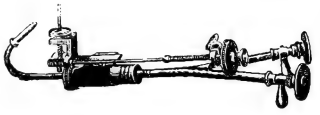
Write for particulars and Testimonials.

Revolution in Jets!!!

1,500 CANDLE-POWER.



These Jets, which have caused a revolution in Limelight, still lead. First in economy, brilliancy, and ease of manipulation. Free trial allowed. Efficiency guaranteed. For Mixed gas or ether.

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merits of the picture—on the screen as it were—than he otherwise could do; unless of course the lantern was lighted up for that purpose. They are obtainable in a single or binocular form, the former being optically arranged for one eye, the latter for two eyes.—*See* also Binocular Lanternescope.

LANTERN SEASON.—Generally considered from the end of September to the beginning of the following April. Literary, scientific, and other institutions have what they call an autumn and winter session, and it is during those terms that they engage the services of the professional lanternists and lecturers. But, although the lecturer looks upon this half of the year as his particular season, it must not be forgotten that there are a considerable number of lanternists whose services are always in season, by day or night, in summer or winter, and during the last year or so, Cinematography has been proof positive of this. Then, again, there are those whose entertainments are not of the "cut and dry" lecturing order, and who command engagements in hall, pavilion, or drawing-room, irrespective of season.

LANTERN SLIDES.—The most beautiful and useful of all photographic productions, and made in a variety of ways, the most popular being by copying in a suitable camera, or by super-position. The first-named is practised most by the professional slide maker, and the latter by the amateur. The objects placed between the condenser and objectives are termed slides. Apart from the aid of photography, thousands of slides are made by what is known as the chromo-lithographic process, then transferred to glass. These are very highly coloured, and for many purposes are most effective.—*See* Photography.

LAWSON'S SATURATOR.—A saturator of the first order, it takes its name from the inventor.

LECTURER'S DESK.—This is an accessory worthy of thought. The experienced lecturer possibly does without it, to him therefore advice does not apply. There are, however, hundreds who cannot well dispense with it, and they are strongly advised *not to try to do without it*. The reading desk, if portable, should, when set up, be rigid, and when possible be made a fixture for the time being. It should not be too large, nor too small. The table that only takes a book, or the speaker's manuscript, is often found inconvenient in use, owing to want of space. Twenty-two inches by fourteen inches is a useful size. When practicable, ordinary gas illuminant is first recommended, and for which a small jet should be carried in the outfit with a few feet of small rubber tubing. The light, whether gas, oil lamp, candle lamp, or otherwise, must be perfectly shaded, and so arranged that the rays fall only on the table.

LENGTHENING TUBES.—*See* Draw-Tubes.

LENS.—In practice, pieces of glass or similar substance, so moulded or cut into two forms, either convex or concave, that rays of light passing through take a different direction. The convex lens magnifies, whilst the concave lens diminishes. There are three or four forms of convex lenses, such as double convex, which is thick in the middle, tapering to almost a knife edge at its edges, the curvature on each side is the same. The *plano convex* is cut convex on one side and flat on the other, whilst what is known as a *miniscus* lens is cut *convex* on the outside, *concave* on the inside, thick at its centre, tapering to thinness at its edges. The double *concave* is just the reverse to the double convex, being hollowed on each side, thinnest at its centre, and thickest at its edges. There are also *plano concave* and the *concavo-convex* lens. Combinations of these several forms are put together for a variety of branches of science, *photography* and the *optical lantern* being among the most important. By a careful union of lenses, of different curvature and refractive power, on a scientific basis, the many different rays of light can be brought to a common focus. Large lenses are recommended for lantern work, the two chief reasons being *more light* and *flatness of field*—which, to a lanternist, is of the greatest importance. (Various *formulæ*, relating to the subject, may be found in works on Optics.)

(*To be continued.*)

Some Remarks on Lantern Slides.—No. II.*

By ALFRED STIEGLITZ.

FOR use take 2 ounces of I. and 4 drops of II., always remembering to add II. to I., and never reversing the operation. This amount of solution will tone at least one slide to a perfect blue. The toning bath, in order to work satisfactorily, ought to have a temperature of 72° to 76° Fahr. Using a bath at a lower temperature results in failure, as the toning proceeds too slowly and unsatisfactorily in other respects. A higher temperature will hasten toning, but the gelatine of the plate is apt to be attacked in a most disagreeable way.

To judge the process of toning, it is necessary to examine the slide by transmitted light, using daylight if possible. A thoroughly toned slide will have a pure blue colour when examined in that way. According to my experience, it is advisable to tone reduced slides after they have been dried, especially in such cases in which only partial toning is to be used. As for the density of toned slides, let me say that those toned with the above bath do not increase in density perceptibly.

GREEN.

In order to obtain a green slide, the following treatment is best:—

I.	Oxalate of iron	20 grains.
	Ferricyanide of potassium ..	15 ,,
	Water	32 ounces.
II.	Chromate of potassium	5 grains.
	Water	16 ounces.

Bathe your slide, which in this case must be somewhat lighter than the desired result, in solution I. In this bath the colour will turn to a dark blue. From this it is placed in solution II. for a minute and then dried. When dry the slide will be a bright green.

* Extract from *Camera Notes*, New York.

Bartolozzi Red.

Bartolozzi red is obtained by using the following bath :—

I.	Ferrocyanide of potassium (yellow prussiate)	15 grains.
	Water	16 ounces.
II.	Nitrate of uranium	30 grains.
	Sulphocyanide of ammonium ..	150 ,,
	Citric acid (crystals)..	30 ,,
	Water	16 ounces.

For use, take one part of I. and one part of II., and place your slide, which must be first thoroughly soaked, in this solution. It will quickly assume a beautiful Bartolozzi red colour. In many cases the whites are stained in colouring the slides in this way, and in order to remove the same dip them into

Carbonate of soda	15 grains.
Water	32 ounces.

for a moment, not longer, and the stain will disappear. After this operation proceed to wash.

Partial Toning.

In using the gold toning bath some beautiful effects of colour may be obtained by so-called partial toning. These colours are obtained by dipping the slides into the toning solution for a short time and then examining them by transmitted light. The combinations of the original ground colour of the slide and the partial deposit of the gold, which is blue, gives us quite a range of purples, blues, reds, greys, blue-blacks, etc., the colour depending upon the ground colour and the length of toning. Many of the snow scenes, before mentioned, were treated in this way.

Local Toning with Different Baths.

While experimenting with the above-mentioned and many other colouring processes, it struck me to try and colour slides by using these baths on one and the same slide locally. In order to succeed quite a little skill in handling the brush and the various solutions, as well as the water faucet, are essential. And even at that, most slides are apt to be spoiled by the colours running into each other. My mode of procedure is as follows :—I take a dry slide, dip into water so as to simply moisten the surface of the gelatine, and then apply the gold toning solution with a small or large brush, as the occasion may require, to those portions of the slide which are to be coloured to blue, and shades of the same, and also the blue-blacks and purples, all of which are obtained by the sulphocyanide bath. After these portions of the slide have been coloured satisfactorily, an operation which is most trying to one's patience and nerves at times, the other portions are treated successively with the various remaining baths. In most cases the results are exaggerations and also crude ; nevertheless, such a slide, especially from a chemical point of view, is of great interest. In certain instances, however, such local colouring or toning is of great effect and beauty, especially if the original ground colour of the slide be kept and another colour simply suggested in parts. Some of the Venetian scenes in which water, sky, and a few houses and gondolas make up the picture, treated in this manner, show up beautifully.

As a general rule the monochrome slide is preferable to those coloured by any means whatever, especially for pictorial purposes. Nevertheless, an occasional suggestion of colour, if used very discriminately and with understanding, relieves the monotony of an evening's entertainment of slides, always remembering that by coloured slides I refer to photographically coloured ones, and not those tinted by hand with aniline dyes. Those can hardly be included within the limits of legitimate photography.

Facts Concerning Light.

By REV. JOHN ST. JOHN.

THE subject of this brief article has been claiming the attention of mankind since the creation of the world. In scriptural history we read (Gen. i., 3) "And God said, let there be light, and there was light," and further on, in the early part of the Christian era, mention is again made of light, and so through all ages and by all people it has ever been seriously considered.

Light seems to govern the laws of all that is animate, and much that is inanimate on the earth's surface, and understood, to a degree, by its appearance or disappearance—by the starling, the wolf, the toad, the lizard, the bear, and all of their kind.

The fruits and vegetation of the land are dependent upon light for their maturity ; look in the garden, the tree is in full blossom, and the fruit gets bigger and fuller each day. Observe that big apple almost hidden by the leaves, and whose very weight all but brings down the slender branch that bears it. At length the breeze disturbs the leaves, and lets in the warm sunshine. From that moment the apple begins to brighten in colour ; it ripens, it matures, it can hold on no longer, and falls, rosy and full-grown, plump into Dame Nature's lap.

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No drag or tear on the Film.

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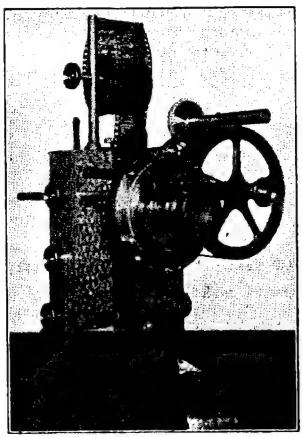

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£8 10s.

No. 1 Type.—Fitted to Lantern Body of Russian Iron, with 4 in. Condenser and Baseboard, **£17 10s.**

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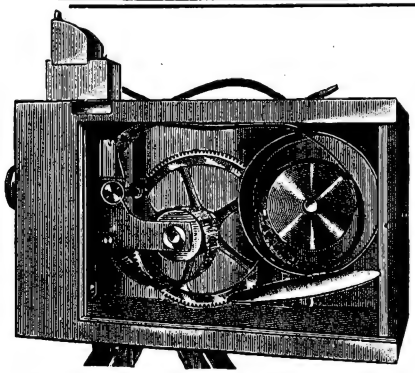

ANYONE CAN USE IT.

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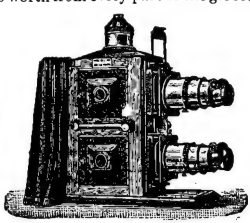
It is the Banner Lantern of the World.

We have sold more of this Lantern than can be proved of any other Lantern in existence, and have thousands of testimonials to its worth from every part of the globe.

Don't go away with the idea that this is our only Lantern that has produced a sensation in the market, Our



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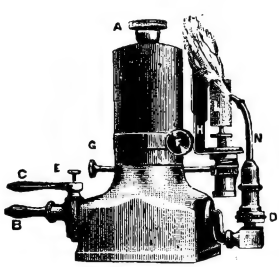
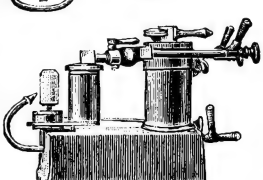


LAWSON Patent SATURATORS



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OUR NEW SETS for this Season include: "The Victorian Era," "Our Brave Firemen," "The City of Mexico," 9 New Illustrated Songs, "Manners and Customs of the East," New sets of "Moses" and "Joseph," "Hawaii," "Niagara," "New York to Niagara," "Life of Luther," "Yellowstone Park," "Old New York," "On the way to Klondike," and many others.

OUR HIRE DEPARTMENT (50 slides loaned for 3s.) is the largest and most complete in the world. Best Sets published added yearly. Outfits sold on Monthly Payments System. For Particulars and Catalogues write

RILEY BROS., 55 & 57, Godwin Street, Bradford, England.

Catalogues, 6d. Hire List, Free. Buyer's Guide, 1½d. Operator's and Hirer's Guide, 2½d., free by post.

It will be quite within the mark to state, however, that it is the science side of light that the readers of this journal are most interested in, so we inquire what does this science teach.

Light is closely associated with heat; appearing both in solids and liquids when intensely heated. It is a succession of exceeding small particles of matter issuing from a luminous body, as the sun, a fire, candle, etc. These particles flow in all directions without interrupting one another, and so minute are they as not to be discernible by our highest power microscopes. If this were not so, instead of being of service to us, they would soon deprive us of sight, by the force arising from their amazing velocity, which is known to be upwards of 11,500,000 miles in a minute.

To demonstrate that the rays of light move in all directions from different bodies without interrupting one another, set up vertically on a table a thin plate of metal, having at its centre a small hole, size of pin. On one side of this plate place a row of lighted candles close together, then place at a short distance from the plate on the other side a

sheet of paper

and it will be seen that the rays of all the candles will form as many specks of light on the paper as there are candles before the plate, and each speck as distinct and large as if there were only one candle to cast one speck, thus showing that the rays do not obstruct each other in their motions, although they all cross at the hole.

Light and heat, as far as the latter depends on the sun's rays, decrease in proportion to the various distances of the planets from the sun, and consequently in proportion to the distance of any object from a fire, a lamp, or a candle.

Now let us see how this will affect the luminosity of a disc on a screen at various distances from the seat of light with the same focus of lens. Take an example from the lanterns set up by Tom, Dick, Harry, and Joe. That of the first named is distanced at two feet between screen and light, the second at four feet, the third at six feet, and the last at eight feet. Therefore, the square of their respective distances will read—first, 4; second, 16; third, 36; fourth, 64. Consequently, Tom enjoys four times as much light or heat as Dick, nine times as much as Harry, and sixteen times as much as Joe, and contrariwise, Joe has to put up with the sixteenth part of the light that Tom has at his disposal. By this rule is determined the proportional quantity of light or heat that the earth, moon, or planets have from the sun.

Ordinary white light is understood to be capable of being split up into two parts or pencils, each composed of white lights, and when this is done they are said to constitute polarised light. Sometimes this separation is effected by certain minerals, sometimes by allowing light to fall upon different substances at a particular angle, when one part is transmitted and the other reflected. This polarisation of the light is very curious, and behaves according to the manner in which it falls, when it appears, as it were, to possess sides. It is found by experiment that the polarising angle is that which the reflected and transmitted portions of the incident ray are at right angles to one another.

The chemical action of light, although not understood perhaps so fully as the action of heat, still it must be admitted that progress in that groove of thought during the past half century has been enormous. The daguerreotype, no doubt, was the key that opened the way to the thousands of natural curiosities in this direction, and built up photography to what it is to-day. The most interesting illustrations of the chemical action of light is undoubtedly those that treat of the tracing of the image on the sensitised plate, and the transference experiments with photogenic papers.

The action of light is conspicuous in its influence on plant and animal life. Absence of the sun's rays is followed by pallid complexion, loss of vitality. Place plants in the dark, with just an opening or so through which light may enter, and it will be found that shoots from the plants will take the direct path of the rays, thus proving the life-giving power of light.

Optics being the twin study of lights, a few facts concerning them will be given in a subsequent article.

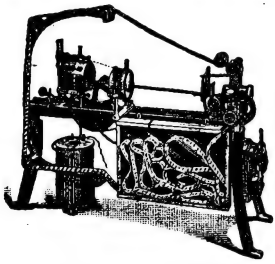
———:o:———

NEW APPARATUS.

THE CINEOGRAPH.

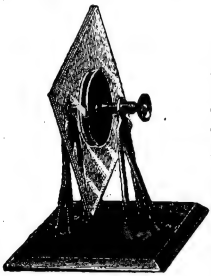
This apparatus, in its complete style, is rather odd looking compared to the lanterns of our younger days. It is specially designed for using endless films, so that a comparatively short film may be made to run for any time

desired. This outfit, which has been brought out by Mr. S. Lubin, 19, South Street, Philadelphia, weighs only 40 lbs., and is designed to



project pictures 16 by 20 feet. It is supplied in complete running order, with four films, each 50 feet long, for $75.

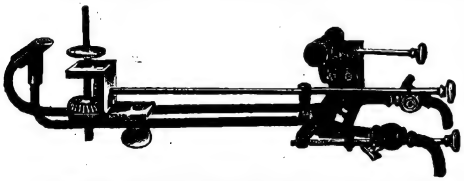
SLIDE VICE.



A new pattern of lantern slide vice for binding slides has been issued by Mr. W. Tylar, of Birmingham. The clamps are held together by means of a spring, and in order to place the slide and cover glass in position it is only necessary to pull back the knob portion.

"OPTIMUS" CENTERING JET.

Messrs. Perken, Son & Rayment have placed on the market an excellent method whereby a jet can be quickly centered from the back of the lantern. Turning the milled head at the right hand side causes the jet to be raised or



lowered while maintaining its parallel position; by this means, in contradistinction to tilting, there is no fear of the nipple causing any shadow. The movement of the left mill-head causes the jet to be adjusted from one side or the other. Both motions work particularly smoothly.

PATENT INTELLIGENCE.

The following List, relating to current Patent Applications, is compiled expressly for the "Optical Magic Lantern Journal" by W. P. Thompson & Co., Patent Agents, of 322, High Holborn, London, W.C., to whom all enquiries for further information should be addressed.

No. RECENT PATENT APPLICATIONS.

23887a. 20th November, 1897. B. J. Atterbury. Improvements in apparatus for the production of acetylene gas. (Date claimed under patents rule 19, 16th October, 1897.)

26591. 15th November, 1897. A. Wartenweiler. New or improved acetylene gas lantern.

26594. 15th November, 1897. E. Helvig. A new apparatus for producing acetylene gas.

26676. 15th November, 1897. F. Schmidt. Improvements in acetylene lamps.

26776. 16th November, 1897. J. Kremer. Improvements in acetylene gas generators.

26842. 17th November, 1897. Improvements in means for selectively using acetylene or the like gas with ordinary lamp apparatus.

26843. 17th November, 1897. E. S. Bond. Improvements in means for storing and using calcium carbide or the like for acetylene and the like gas generating apparatus.

26978. 18th November, 1897. E. T. Butler. A stereoscopic camera for producing negatives for the use of the krumscope or for other uses.

27029. 18th November, 1897. R. Von Maiti. Improvements in acetylene lamps.

27409. 22nd November, 1897. A. Faillsol and H. Besson. An improved acetylene gas lamp or lantern.

27505. 23rd November, 1897. N. Nelson. Improvement in apparatus for taking, enlarging, and projecting successive pictures of moving objects. Complete.

27542. 23rd November, 1897. A. S. Newman and Newman and Guardia, Limited. Improvements in apparatus for producing limelight or the like.

27929. 27th November, 1897. C. W. Baxter, C. Wray, and J. Oulton. Improvements in film operating mechanism of apparatus for taking, printing, and exhibiting series of photographs.

28012. 27th November, 1897. H. H. Lake. (W. A. Shearer, South African Republic.) Improved apparatus for the production of acetylene gas from calcium carbide.

28121. 29th November, 1897. A. J. Morrison. Combined generator and lamp for making and burning acetylene gas.

28478. 2nd December, 1897. T. Barkley. Improvements in devices for adjusting limelight and other jets for magic lanterns.

28577. 3rd December, 1897. W. H. Duncan. Improvements in apparatus for showing photographs and moving pictures with and without coin-freed appliances.

28634. 4th December, 1897. H. E. Berry. Improvements in and connected with apparatus for producing animated photographs.

What a few Contemporaries say about our Annual for 1897-8.

THE MAGIC LANTERN JOURNAL ALMANAC AND ANNUAL.—This annual, edited by J. Hay Taylor, comes again at the beginning of the lantern season, and will be found interesting, containing, as it does, much useful information. A page is given to each month with space for a line to each day, not overmuch space for putting down data or engagements. The ready reference table, giving data as to size of disc in relation to focus of lens, is most helpful. W. Fenton-Jones gives some excellent advice on "Lantern slide making and marking." Edmund H. Wilkie's contribution, "The dawn of animated photography," will surely find many readers at this moment, especially as it is entertainingly written. C. W. Locke speaks of the use of a very large screen in "Optical projection at the Royal Albert Hall." G. W. Breck's article on "Optical projection in California" is interesting. There will be many to whom the novelty treated of in "Cartoon lantern entertainments" of Theodore Brown will appeal. R. Moss's contribution on "Acetylene gas and lantern work" is opportune and valuable. A. Lomax, while writing on the "Cinematograph and phonograph," points out that the combination is unlikely of accomplishment, interesting as such a thing would be. H. G. Madan's "Lantern experiments in colour" will afford much interest and suggest plenty of experiments. The regulations governing the use and storage of calcium carbide and petroleum which are given should be useful. A short summary of new projection apparatus is also given.—*Photography.*

THE LANTERN ANNUAL.—Mr. J. Hay Taylor's volume for 1897-98 comes as a sign of the lantern season, and, like the volume issued last year, it is full of useful suggestions and hints to the lanternist, whether he be a beginner or an old practitioner.—*The Amateur Photographer.*

THE ALMANAC AND ANNUAL OF THE MAGIC LANTERN JOURNAL AND PHOTOGRAPHIC ENLARGER FOR 1897-98 shows considerable taste in get up, and is well printed on good paper. It will be found a daily companion for all interested in the subject of the magic lantern, and the information conveyed in its pages must render it an invaluable aid to lanternists. The subjects treated embrace every phase of lantern work, filling over 150 pages, well illustrated.—*The Photographer.*

THE MAGIC LANTERN JOURNAL ANNUAL, 1897-98. Edited by J. Hay Taylor. Published at 9, Carthusian Street, E.C.—The second issue of this annual gives as its frontispiece an excellent portrait of the editor, from a negative by Mr. Hubert, of Hackney. A considerable number of articles on topics connected with optical projection are included in the volume. They emanate from practical writers, who are *au fait* with their subjects. Notices of apparatus and other useful information complete the annual, which is well got up.—*The British Journal of Photography.*

THE MAGIC LANTERN JOURNAL ALMANAC FOR 1897-98.—This useful annual is amply fulfilling the promise held out by last season's volume. Many excellent articles on lantern work are to be noticed in the copy we have received, the list of authors including such well-known names as W. Stocks, C. W. Locke, E. H. Wilkie. W. Fenton-Jones, A. L. Henderson, W. J. Coles, Thomas Bolas, E. Dunmore, and John Anderton. There is an interesting contribution on acetylene by R. Moss, and animated photography also receives attention from several writers. The legal status of calcium carbide is fully dealt with in extracts from the Petroleum Acts, and from the regulations of the London County Council; and in the apparatus section most of the lantern novelties of the past twelve months are illustrated and described. The book is well-printed, and is full of interest and instruction for the world of lantern workers. —*The Photographic Dealer.*

THE MAGIC LANTERN JOURNAL ANNUAL, 1897-98.—This annual appears once more in its usual form. The articles are most of them useful and practical.—*Practical Photographer.*

THE MAGIC LANTERN JOURNAL AND PHOTOGRAPHIC ENLARGER ALMANAC AND ANNUAL.—Mr. J. Hay Taylor, the editor, has brought out a useful volume, which cannot fail to interest lanternists and lantern slide makers. It contains, in addition to a large number of advertisements, several well-written articles on kindred subjects. A specially interesting portion of the annual is the chapter on novelties dealing with cinematographs, wherein a fully-illustrated view is afforded of the principal instruments on the market under the various names of motorgraph, kinematograph, animatograph, etc., etc.—*Journal of the Amateur Photographic Society of Madras.*

THE MAGIC LANTERN JOURNAL AND PHOTOGRAPHIC ENLARGER ALMANAC FOR 1897-98 is, like its predecessor, full of practical hints and suggestions for lantern workers. As befits the spirit of the times, it has an article by Edmund H. Wilkie on "The dawn of animated photography," and its practical articles include one on "Mask cutting and other suggestions" by G. W. Smith, "Practical hints" by Walter Sprange, "Optical projection at the Royal Albert Hall" by C. W. Locke, "Notes on photographic enlargements" by W. Stocks, "Printing in clouds in lantern slides" by A. Norman, "Difficulties with dissolving taps" by G. W. Gwyer, jun., "Cartoon lantern entertainments" by Theodore Browne, "Home-made enlarging apparatus by Hilton Grundy, "The ether light" by Ernest H. Shears, "A combined lantern case and stand" by the Rev. T. Dallison, B.A., "Acetylene gas for lantern working" by James W. Garbutt, "Lantern experiments on colour" by H. G. Madan, and a great number of other subjects.—*The Photogram.*

THE MAGIC LANTERN JOURNAL AND PHOTOGRAPHIC ENLARGER ANNUAL FOR 1897-98 contains a series of articles on subjects connected with the lantern, such as making and toning of slides and the correction of errors, the working of the lantern, the management of the light, making enlargements, and reduction, etc. These are for the most part written by photographers of experience. A section of the book dealing with the novelties of the year and well illustrated is of much value, and the editor, Mr. J. Hay Taylor, is to be congratulated on his work.—*The Illustrated Edinburgh News.*

THE MAGIC LANTERN JOURNAL AND PHOTOGRAPHIC ENLARGER ALMANAC AND ANNUAL. Edited by J. Hay Taylor.—We are glad to again welcome this annual, which contains numerous interesting articles by practical writers on all lantern matters, and many a valuable hint is to be learnt from the same. It forms a very readable volume, and full of meat.—*The Photographic News.*

Price of the Annual—Paper, 2/-; Cloth, 2/6; postage 4d. extra.

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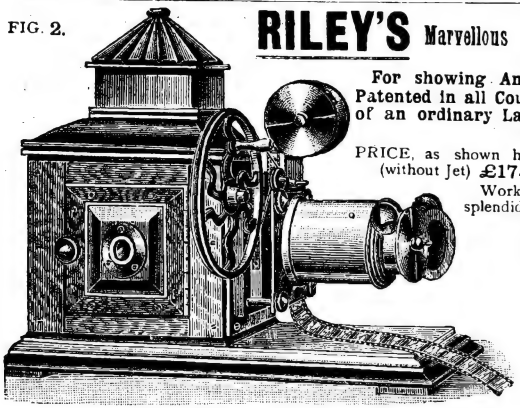
FIG. 2.

RILEY'S Marvellous *Kineoptoscope*

For showing Animated Photographs on the Screen. Patented in all Countries. Can be fixed into the Stage of an ordinary Lantern—an Advantage possessed by no other Apparatus.



PRICE, as shown here (without Jet) **£17.**
Works splendidly.

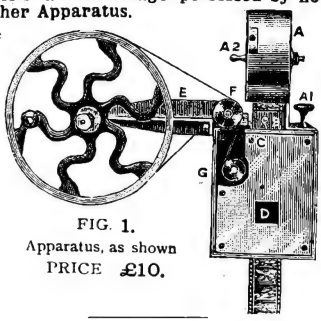
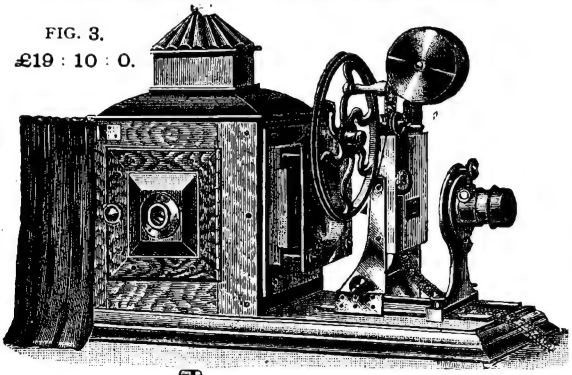


FIG. 1.
Apparatus, as shown
PRICE **£10.**

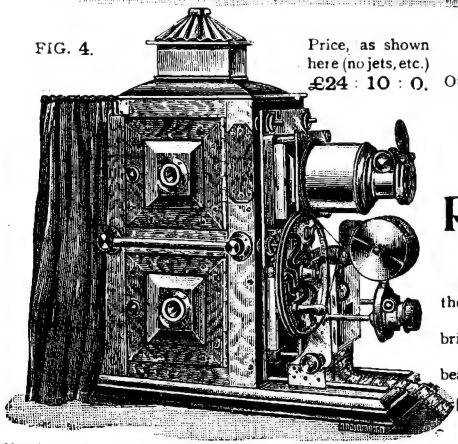
FIG. 3.
£19 : 10 : 0.



Apparatus only .. **£10 : 0 : 0.**
Complete, with Russian Iron Lantern, Alum Tank and Lens, in case .. .. **£15 : 10 : 0.**
Complete, with Mahogany Lantern, fitting into stage, as shown (Fig. 1) .. .. **£17 : 0 : 0.**
Do. as shown (Fig. 3) from **£19 : 10 : 0** to **£24.**
Do. Bi-unial Lantern (Fig. 4) **£24 : 10 : 0** to **£32.**

KINEOPTOSCOPE CAMERA
for taking Cinematograph Negatives,
20 Guineas.
LIBERAL DISCOUNTS TO THE TRADE.

FIG. 4.



Price, as shown here (no jets, etc.)
£24 : 10 : 0.

FILMS.

Our own make supplied, Wholesale and Retail. Good subjects. Steady motion.
ALL OTHER MAKERS' FILMS SUPPLIED.
Write for Kineoptoscope Pamphlet, Free on application.

RILEY BROTHERS,

55-57, Godwin St., BRADFORD, Eng.,

Invite all interested in Projecting Apparatus to write them for particulars of this wonderful machine.

A challenge to all other machines for being steady, bright, devoid of flicker, strong, portable, and simple.

Professor Steen writes—"Success unprecedented; beats all other machines. Never had one breakdown."

6 Best Quality Films, assorted, from £18 upwards.
ALL BEST FILMS SUPPLIED.

May be seen at work in LONDON, and purchased from— **O. SICHEL & CO., 20, Berners Street, Oxford Street, LONDON.**

28773. 6th December, 1897. J. W. Scarth and W. A. Thornton. Improvements in or relating to lamps for burning acetylene gas.

29347. 11th December, 1897. A. Elsee and H. S. Pyne. An electrical slide changing apparatus and dissolver for optical lanterns.

29363. 11th December, 1897. W. Friese-Greene. Means or apparatus for producing and exhibiting animated or changing pictures on advertising and the like appliances carried on the person.

29364. 11th December, 1897. W. Friese-Greene. Means or apparatus for producing and exhibiting animated or changing pictures on vehicles, steam boats and the like for advertising and other purposes.

SPECIFICATIONS PUBLISHED.

Copies of the following specifications may be obtained by remitting 1/- for each specification to W. P. Thompson & Co., Patent Agents, 322, High Holborn, London, W.C.

27194 of 1896. Hargreaves. Acetylene gas.
658 of 1897. Tèdé. Acetylene gas.
991 of 1897. Dowsing. Producing X-rays on a screen.
21480 of 1897. Symons. Moveable devices for producing optical illusion changes (transparencies).
1929 of 1897. Thorp and Marsh. Acetylene gas.
16388 of 1897. Casler. Cinematographs and like machines.
16738 of 1897. Acetylene lamp.
26325 of 1897. Bault (Alexandre). Acetylene gas.

——:o:——

Editorial Table.

PHOTOGRAPHIC MOSAICS.—This American annual, which has reached its 39th appearance, may be obtained from Dawbarn & Ward, Limited, London; price 2s. It contains several articles and hints of value to the photographer, also excellent illustrations.

THORNTON-PICKARD CATALOGUE.—The 1898 catalogue of the Thornton-Pickard Manufacturing Company, Limited, of Altrincham, contains details of substantial cameras, shutters, etc., made by this firm. Many clear half-tone illustrations of instantaneous photography are also to be found in its columns. As announced on another page of this journal, this firm is offering £200 as prizes in a coming competition.

"WRENCH'S CATALOGUE."—Year by year the catalogue issued by the wholesale firm of Messrs. Wrench and Son, for use in the trade, has been growing. This year's issue, which has just come to hand, is a huge volume, and we note that they have kept the apparatus section low in favour of their lists of slides. So as to make room for these all reference to cinematographs has been omitted and a separate list for these has been issued. The sets of slides is enough to bewilder one, for close on 500 pages are devoted to lists of these. To give particulars here would be impossible, but the following abridgment will give a rough idea of what is to be found in the catalogue. In some instances some 70 pages are devoted to one particular heading as given by us. This abridgment comprises:—England, Wales, Scotland, Ireland, Great Britain, Islands round Great Britain, France, Italy, Germany, Holland, Belgium, Austria, Switzerland, Spain, Norway, Greece, Turkey, Syria, India, Ceylon, China, Japan, Holy Land, Africa, Egypt, America, Arctic Regions, Australia, New Zealand (Islands, travels, wars), Lives of eminent men, Educational sets (scientific), Astronomy, Human anatomy, Insect life, Earth worms, Plant life, Microscopic objects, Educational sets (miscellaneous), Commercial Geography of the British Possessions, The History of Great Britain, Instantaneous Studies, Yachts, Battle Ships, Cruisers, etc., British Army, Auxiliary Forces and Royal Navy, Portraits from life, Statuary, Common things, Natural phenomena, Æsop's Fables, Fables of "La Fontaine," Book of Martyrs, Mottoes, comic mottoes, curtains, and introductory slides, Illustrated songs, Illustrations of Poems by Burns, Illustrated songs from life models, Life model sets, Temperance tales from life models, temperance sets, Temperance entertainments, Nursery tales, Comic and miscellaneous sets, Religious subjects, Parables of our Lord, Service of Song slides, Allegorical Scripture History, English Church History, Sacred Pictures, Hymns, Temperance Hymns, Sankey's Hymns, Illustrated Hymns. We observe that Stocks' lamp, of which Messrs. Wrench are the proprietors, has been further improved and that they claim the new pattern to give 125 candle-power.

——:o:——

Correspondence.

CARELESSNESS OF DEALERS.

To the Editor.

SIR,—Thank you very much for allowing the correspondence of Mr. A. Downes Shaw to appear in your journal, for what is the use of a magic lantern journal if only the interests of one party is considered, and that the trade only.

A great many of us are lecturing with the lantern in chapels and churches, and some of these places are now shut up against us simply because of the misfortune in connection with the use of saturators; and it is not a small matter to charge a shilling for a lecture, and four or five hundred present in the chapel to endure the unpleasant thing to sit down for two hours to look at the miserable pictures shown by a small Russian iron oil lantern, and sometimes without any pictures at all.

I myself had an audience of 500 in a chapel to hear a lecture with the limelight lantern, but the saturator failed me altogether, and I had to dismiss the audience; and though I printed posters and sent the town crier about the town to announce the same lecture free this time, not more than two dozen came the second time.

Another great annoyance I had was, that the valve tap of the oxygen cylinder and the key supplied by the same firm did not fit, so the audience had to put up with pictures shown with a small oil lantern, but after 15 minutes unsuccessful trials with the key, at last the valve opened, but it opened too wide, and not one of the audience nor myself could close it, which set the lantern all in a blaze; I had to disconnect the tubing and take the cylinder to the open air and thus waste the gas. If these things are allowed to pass unnoticed, no church, chapel, or schoolroom will be opened for lectures with

ether saturators or limelight. This is greatly to be deplored, because some of us live 200 miles from a firm which supply cylinders and gas or saturators, and railway carriage alone for two cylinders amounts to 10s.

I hope you will invite the readers of your journal to communicate their thoughts on these points.

Yours truly,
CARRADOG.

—:o:—

Notes and Queries.

J. D.—It is very questionable if you would be able to obtain sufficient and proper lighting, even under the best conditions, to take cinematographic pictures of a theatrical play on the ordinary stage; such pictures require good light, and are usually taken on a stage erected in the open air and in bright light. If, however, you have the option of using the illuminants quoted by you, we would think the electric light, properly placed, the best.

A. B. Coleman.—The "ejector" we know to be good, the other we have not yet had an opportunity of trying, although the makers have promised to allow us to try it. This promise was made some time ago, but up to this date has not been fulfilled, consequently we cannot offer any opinion at present. It is, however, said to be good.

Frank Richards writes:—I bought a double lantern lately, but when putting the effect slides in their proper places in each lantern, found that they fell a long way out on the screen. The makers of the slides assure me that they are all right, but my lantern proves to the contrary. How should I alter the slides to make them fall right upon the projected picture? *Ans.*—We are quite confident from your query that you are a novice at lantern work, at least, in effect working. It is possible the slides may be all right, so for the present leave them alone. If your lantern has not already got, then get, two adjusting stages which can be fastened in the present stage, also get two registering crosses, put one in each stage, and adjust the false stage until the discs coincide on the screen. When this is done then put the slides in and out or add to the frames until they also coincide on the screen. If this is not sufficiently lucid consult our back numbers (all of which can be obtained from the publishers), or write asking some definite question or questions.

J. Mumford.—We should advise you to do as you suggest.

Ch. Wake, Jun.—Be sure that the facts are as you state before taking any proceedings; if they are, then you should gain it, in our opinion; but at the best, law is so uncertain that if you can compromise do so by all means, and have a slight loss in the matter. To fight a strong firm is no joke.

R. Rose writes:—I have often noticed in accounts of a lantern entertainment that the apparatus has been described in the local papers as being a "powerful lantern"; can you tell me the difference between an ordinary lantern and a powerful lantern? *Ans.*—We presume the expression refers to limelight in contradistinction to oil, but perhaps it had best be taken merely as an empty expression. A good deal of latitude is taken by exhibitors in connection with their show bills which will not bear literal translation. We have known a new and showy lantern to be described as "powerful," and the same make but shabbier through use, used under about the same conditions, mentioned without this qualifying word.

A. Y. M.—We have several times been promised an opportunity of trying No. 1, but so far have not had the opportunity afforded us, so at present must say we are ignorant as to its behaviour. Nos. 2, 3, 4, are all first-rate, and you cannot go far wrong in taking either. You must remember that the more light the more heat.

J. asks:—How can I obtain good coloured slides from photographs? If you wish to make the slides from small unmounted photographs you can in an ordinary printing frame make a negative by contact and in the same manner a lantern transparency from the negative so obtained; by this means you will get all the fine detail which is in the print. If the print be mounted or large, it will require to be copied in the camera, and a transparency made from this. Not knowing the extent of your photographic and artistic knowledge we can only say that you may be able to make a passable transparency with a few instructions, but as for the colouring you might find it preferable to entrust it to some one who makes a business of such.

R. Hopwood.—We must congratulate you on your knowledge of English, and think you deserve the greatest credit in thus acquiring it. You suggest writing us fuller in your own language (Welsh), please don't, for Welsh is a language in which our education has been neglected. We once knew a native of your parts who used to give us some jaw-breaking recitations presumably to show the power of the language, and we quite made up our minds never to attempt to acquire it. However, any definite questions which you may ask will have prompt attention, but keep to the English language, please.

G. E. Brown.—Article was returned, for although very interesting, it is not suitable for our columns, but there are no doubt many slide makers who would be glad to acquire it as a reading for a set of slides on the subject, *i.e.*, Sugar.

Lanternist.—(1 and 2) An opaque screen of say 8 feet will be preferable for drawing-room entertainments. (3) Certainly, take a stand with you, but it need not be a tripod. (4) With oil light a guinea should be about the fee.

P. Newland.—You ask if we are not in error on some point or other *re* description of oxygen generator, but you do not say what these points are. When we notice an apparatus and say it does so-and-so, it is because we have found the particular article which we have tried to behave thus in our hands. If you think we are wrong in the case cited, be good enough to particularise.

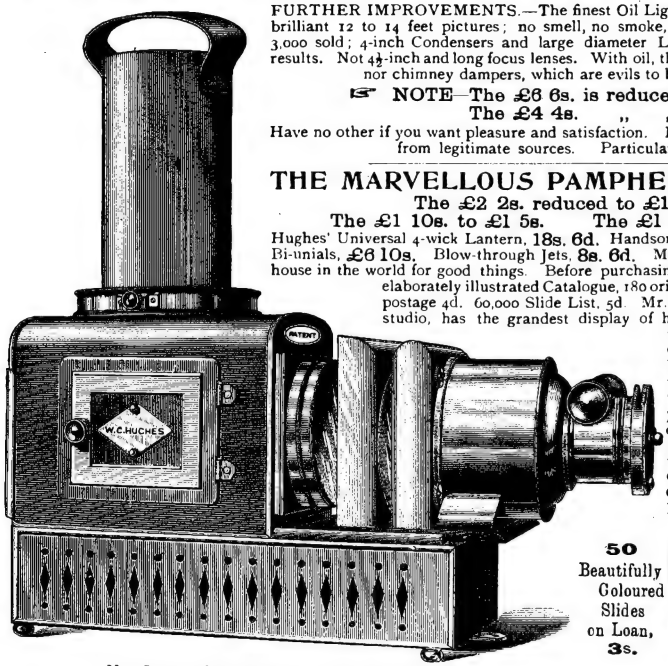
D. S. B.—(1) We think not. (2) For acetylene gas we use the 00000 burner in front of the 0000. (3) Four and even five burners have been used together, but we have confined ourselves to two only, hence have no actual experience; but in the manner you suggest you would get too large a surface, and we think also smoke at the point of juncture. (4) Clean chamois or silk.

H. T. Walton.—Kerosene oil of high flashing point is the best to use in a Stocks' lantern lamp.

W. D. Askew.—Procure the slide catalogue issued by Valentine & Son, of Perth-road, Dundee. From this you will be able to select such slides as will best fit in with Scotch songs.

Several interesting articles have been held over till next issue for want of space.

HUGHES' MARVELLOUS PAMPHENGOS.



FURTHER IMPROVEMENTS.—The finest Oil Lighted Lantern extant, gives brilliant 12 to 14 feet pictures; no smell, no smoke, no broken glasses; over 3,000 sold; 4-inch Condensers and large diameter Lenses, which give superb results. Not 4½-inch and long focus lenses. With oil, these involve loss of light—nor chimney dampers, which are evils to be eschewed.

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The £4 4s. ,, ,, £3 10s.

Have no other if you want pleasure and satisfaction. Hundreds of Testimonials from legitimate sources. Particulars Free.

THE MARVELLOUS PAMPHENGOS LAMPS.

The £2 2s. reduced to £1 10s.
The £1 10s. to £1 5s. The £1 1s. to 16s. 6d.

Hughes' Universal 4-wick Lantern, **18s. 6d.** Handsome mahogany brass fronted Bi-unials, **£6 10s.** Blow-through Jets, **8s. 6d.** Mixed Gas, **12s.** Cheapest house in the world for good things. Before purchasing, send for Mr. Hughes' elaborately illustrated Catalogue, 180 original engravings, price 6d., postage 4d. 60,000 Slide List, 5d. Mr. Hughes, at his rooms and studio, has the grandest display of high-class Projecting Lanterns, Novelties, Effects, Carriers, &c.,&c., the world has ever seen. The "Docwra," the "Grand," the "Miniature Malden" Triples, as supplied to Madame Patti, Prof. Malden, Dr. H. Grattan Guinness, the Maharajah of Mysore, Colin Docwra, Esq., Capt. Chas. Reade, R.N., the Polytechnic, &c., &c. Pamphlets free.

50 Beautifully Coloured Slides on Loan, 3s.

New Lecture Sets, Nansen and Queen's Jubilee, &c.

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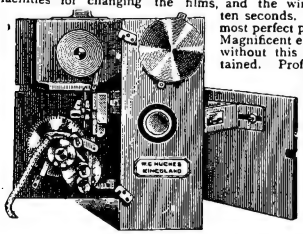
No shutter. No flickering. For showing the Living Pictures. Magnificent results. Pictures obtained with this machine from 8 to 20 feet. No shutter, therefore no flickering, which eclipses all others in the world. No eyesache and headache. Will show pretty pictures alternately, and has great facilities for changing the films, and the winding of same done in ten seconds. Is the most simple and most perfect piece of mechanism extant. Magnificent engineers' high-class work without this perfection cannot be obtained. Professor Malden says:—"A great success. The machine works beautifully, and brought down uproarious applause. The people, with one accord, say it is the best they have ever seen."



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No. 2, price £24 10s.
complete. If without Lanterns, No. 1, £27; No. 2, £20. Illustrated particulars, 2d.

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Precisely the same in principle as Nos. 1 and 2. A portable, perfect, and cheap little Instrument.

Particulars Free.

HUGHES' MOTO BIJOU

Living Picture Camera.

The most simple and perfect extant. Weighs only 6 lbs. Measures only 7¼ by 4½ by 7¼. Can be used as a Camera, a Projector, and a Hand Camera. **Price £15.**

Ditto, for 2½-inch Films, **£35.** Ditto, for 3-inch Films, **£56** Particulars Free.

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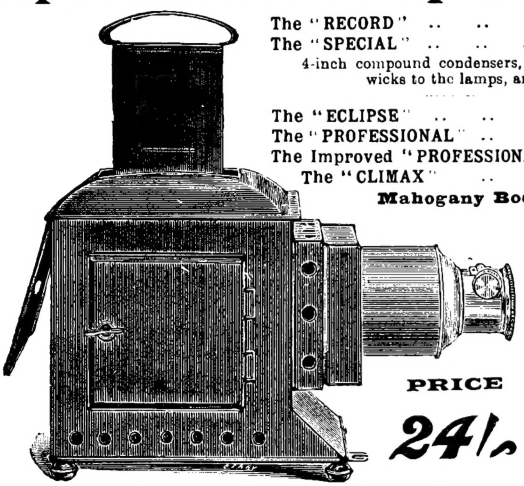

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4-inch compound condensers, achromatic portrait front lenses, 2-inch wicks to the lamps, and complete in travelling cases.

The "ECLIPSE" .. .. .. 3 wick 28/6 .. 4 wick 30/-
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Mahogany Body Lanterns from 64/6.

PRICE 24/-

ROBERT H. CLARK'S
NEW "STANDARD" LANTERN.

Complete in Travelling Case—
With 3 (2-in.) wick Lamp **24/-**
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TESTIMONIAL.
35, Hartland Road, West Ham, Essex,
October 25th, 1893.

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Faithfully yours,
JAMES A. SPARKES.

Robert H. Clark's "Silver Star" Russian Iron Lantern

As supplied to the "Silver Star" Society. (The Marquis of Northampton, President)

Prices from 67s. 6d. *FOR FULL DESCRIPTION, SEE CATALOGUE.*

The following important Testimonial has been received from the Hon. Sec. to the "Silver Star" Society:—
"MY DEAR SIR,—After having used your Lanterns at over 300 lectures in all parts of London and the Suburbs, and various country towns and villages, it gives me much pleasure to say that they have given us the greatest possible satisfaction. Yours faithfully, WALTER S. ROBBINS."

Robert H. Clark's New Pattern Russian Iron Lantern.

Fitted with Stocks' patent lamp (125 standard candle-power), the most perfect, most powerful, and most portable Oil Lantern ever made. **Price complete £4 10s.**

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Lantern Stands from 12s. 6d. "Lightning" Double Carrier Frames from 1s.
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Grooved Boxes to hold 50 Slides, 1s. 2d. Screens, Screen Stands, and all other Accessories.

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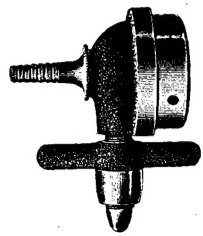
Gentlemen wishing to include property in these Sales are requested to send particulars one week prior to sale.

METALLIC BELLOWS REGULATOR

(BRIER'S PATENT)



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Have been favourably commented on in all parts of the World.

All Slides are made by the COLLODION PROCESS, ensuring the Pluck and Brilliancy so much admired, and so necessary in a good slide.

Slides prepared from Customers' Negatives at **6s.** per doz. From Prints, Photos, etc., **12s.** per doz.

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Is the best Blow-through on the Market, absolutely safe, brilliant light, equal to mixed jet and hard lime; gas at ordinary pressure from the main can be used.

Read the following report (Optical Magic Lantern Journal, November, 1894) on the Candle-power of various Jets, by Mr. W. J. Coles, A.M.I.C.E :—

Ordinary blow-through Jet, soft lime ..	260 candle-power.
Wood's special blow-through Jet ..	475 " "
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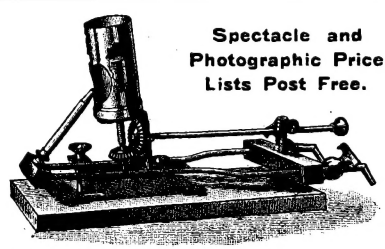
Price of Jet, best workmanship and finish, £1 11s. 6d.



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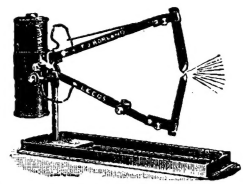

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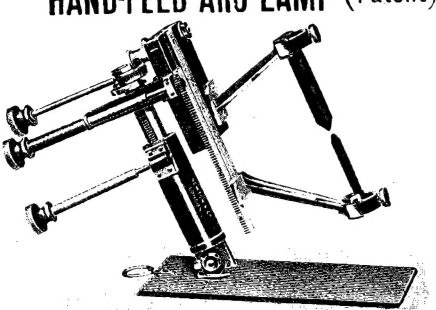

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